INSTRUCTION MANUAL

MODELS 180 AND 180 LF
SWEEP/FUNCTION GENERATORS

WAVETEK

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MODELS 180 AND 180 LF SWEEP/FUNCTION GENERATORS

WAVETEK
Box 651, San Diego, Calif., 714-279-2200

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WARRANTY

All Wavetek instruments are warranteed against defects in material and workmanship for a period of one year after date of manufacture. Wavetek agrees to repair or replace any assembly or component (except batteries) found to be defective, under normal use, during this period. Wavetek's obligation under this warranty is limited solely to repairing any such instrument which in Wavetek's sole opinion proves to be defective within the scope of the warranty when returned to the factory or to an authorized service center. Transportation to the factory or service center is to be prepaid by purchaser. Shipment should not be made without prior authorization by Wavetek.

This warranty does not apply to any products repaired or altered by persons not authorized by Wavetek, or not in accordance with instructions furnished by Wavetek. If the instrument is defective as a result of misuse, improper repair, or abnormal conditions or operations, repairs will be billed at cost.

Wavetek assumes no responsibility for its product being used in a hazardous or dangerous manner either alone or in conjunction with other equipment. High voltage used in some instruments may be dangerous if misused. Special disclaimers apply to these instruments. Wavetek assumes no liability for secondary charges or consequential damages and, in any event, Wavetek's liability for breach of warranty under any contract or otherwise, shall not exceed the purchase price of the specific instrument shipped and against which a claim is made.

Any recommendations made by Wavetek for use of its products are based upon tests believed to be reliable, but Wavetek makes no warranty of the results to be obtained. This warranty is in lieu of all other warranties, expressed or implied, and no representative or person is authorized to represent or assume for Wavetek any liability in connection with the sale of our products other than set forth herein.

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SAFETY

This instrument is wired for earth grounding via the facility power wiring. Do not bypass earth grounding with two wire extension cords, plug adapters, etc.

BEFORE PLUGGING IN the instrument, comply with installation instructions.

MAINTENANCE may require power on with the instrument covers removed. This should be done only by qualified personnel aware of the electrical hazards.

WARNING notes call attention to possible injury or death hazards in subsequent operations.

CAUTION notes call attention to possible equipment damage in subsequent operations.

SECTION 1
GENERAL DESCRIPTION

1.1 THE MODELS 180 AND 180LF

The Wavetek Model 180 Sweep/Function Generator is a precision source of sine, triangle, and square waveforms. Frequency of the waveforms is manually and remotely variable from 0.1 Hz to 2 MHz. The generator can repetitively sweep from one frequency to a higher frequency, with controllable rate and range of sweep. Amplitude of the waveforms is variable from 10V peak-to-peak into 50Ω down to 30 mV p-p. DC reference of the waveforms can be offset positively and negatively.

A voltage representing generator frequency, a fixed amplitude pulse train of that frequency, and a voltage ramp representing frequency sweep rate are provided as front panel outputs.

The Wavetek Model 180LF (Low Frequency) Sweep/Function Generator is identical to the Model 180 except for frequency range: 0.01 Hz to 200 kHz.

1.2 SPECIFICATIONS

The specifications (available waveforms, frequencies, and amplitudes), operating modes, precision (accuracy), and purity (quality) are listed in the following paragraphs.

1.2.1 Versatility

Output Signals
Sine ∿ , triangle △ , square ⊓ , TTL pulse ⊓ , ramp ◿ and DC.

Control
Generator operates in continuous and sweep modes. Frequency controlled manually or with external voltage.

Frequency Range
0.1 Hz to 2 MHz (180); 0.01 Hz to 200 kHz (180LF).

Operating Frequency Ranges
Model 180:

X 1	0.1 Hz to 2 Hz
X 10	0.1 Hz to 20 Hz
X 100	0.2 Hz to 200 Hz
X 1K	2 Hz to 2 kHz
X 10K	20 Hz to 20 kHz
X 100K	200 Hz to 200 kHz
X 1M	2 kHz to 2 MHz

Model 180LF:

X .1	0.01 Hz to 0.2 Hz
X 1	0.01 Hz to 2 Hz
X 10	0.02 Hz to 20 Hz
X 100	0.2 Hz to 200 Hz
X 1K	2 Hz to 2 kHz
X 10K	20 Hz to 20 kHz
X 100K	200 Hz to 200 kHz

Main Output
Sine, triangle and square waveforms and DC are selectable. HI (0 dB) and LO (−20 dB) BNC outputs are available for simultaneous usage; outputs may be varied to HI (−30 dB) and LO (−50 dB) by amplitude control. HI output provides 20V peak-to-peak max open circuit (10V peak-to-peak max into 50Ω load). LO output provides 1V peak-to-peak max into 50Ω load. Both output impedances are 50Ω.

DC Offset and DC Output
DC offset of waveform and DC output selectable and variable through HI and LO BNC outputs. HI output ±10V max (±5V into 50Ω load) as offset or Vdc output. LO output ±1V max into 50Ω load as offset or Vdc output. Waveform offset limited to ±10 Vp HI and ±1 Vp LO (both open circuit voltages).

Pulse Output
TTL pulse (50% duty cycle) at generator frequency. Drives up to 20 TTL loads.

GCV Output
0 to +2V (nominal, open circuit) proportional to frequency of main generator. Output impedance 600Ω.

VCG — Voltage Controlled Generator Input
VCG voltage as well as control settings select generator frequency. Frequency may be dc-programmed or ac-modulated by external 0 to 2V signal. Input impedance is 2 kΩ. VCG input can change generator output 1000:1 on all ranges except X 10 Hz and X 1 Hz ranges (Model 180) and X 1 Hz and X .1 Hz (Model 180LF).
VCG Input Signal Bandwidth: 100 kHz.
VCG Slew Rate: 0.1V/μs.

Sweep Output
Ramp waveform output with 5V peak into open circuit. Output impedance 600Ω.

1.2.2 Operating Modes

Continuous
Operates as standard VCG. Frequency of main generator determined by dial/range setting and VCG input voltage.

Sweep
Main generator is frequency modulated by internal sweep generator. When swept, main generator frequency rises from frequency set by the dial and range setting to a frequency set by sweep width control.
Sweep Rate: 30 ms to 20s (nominal) continuously adjustable by single turn control on front panel.
Sweep Width: Up to 1:1000 adjustable on all ranges except X 1 Hz and X 10 Hz ranges (Model 180) and X .1 Hz and X 1 Hz (Model 180LF).

1.2.3 Horizontal Precision

Dial Accuracy
Model 180: ±3% of full scale for 0.1 Hz to 2 MHz.
Model 180LF: ±3% of full scale for 0.01 Hz to 200 kHz.

Time Symmetry
Models 180 and 180LF, as applicable: ±1% on all but X 1M range.

1.2.4 Vertical Precision

Amplitude Change With Frequency (Sine)
Models 180 and 180LF, as applicable:
Less than ±0.1 dB on all ranges thru X 100K.
Less than ±0.5 dB on X 1M range.

1.2.5 Waveform Purity

(Models 180 and 180LF, as applicable)

Sine Distortion
Less than 0.5% on X 100, X 1K, X 10K ranges (typically 0.2%).
Less than 1.0% on X 1, X 10, X 100K ranges (typically 0.5%).
All harmonics 30 dB down on X 1M range.

Square Wave Rise and Fall Time
Less than 75 nanoseconds.

Triangle Linearity
Greater than 99% to 200 kHz.

1.2.6 Environmental

Specifications apply at 25°C ±5°C. Instrument will operate from 0°C to +50°C.

1.2.7 Mechanical

Dimensions
11¼ in./28.6 cm wide; 4 in./10.2 cm high; 10½ in./26.7 cm deep.

Weight
6.5 lb/2.9 kg net; 9.5 lb/4.3 kg shipping.

1.2.8 Power

105 to 125V or 200 to 250V, 50 Hz to 400 Hz. Less than 15 watts.

NOTE

All specifications apply when frequency dial is between 0.1 and 2.0, amplitude is at 10V p-p and output is from HI BNC into 50Ω load.

SECTION 2
INITIAL PREPARATION

2.1 UNPACKING INSPECTION

After carefully unpacking the instrument, inspect the external parts for damage to knobs, dials, indicators, surface areas, etc. If there is damage, file a claim with the carrier who transported the instrument. Retain the shipping container and packing material for use in case reshipment is required.

2.2 PREPARATION FOR USE

Before connecting the instrument to line power, check that the rear panel 115/230V switch is set to the value nearest the line voltage and that the fuse is correct for the switch setting. Check that the plug on the power cord is the mate for the line receptacle.

2.3 ELECTRICAL ACCEPTANCE CHECK

This checkout procedure provides a general verification of generator operation. Should a malfunction be found, refer to the Warranty in the front of this manual.

An oscilloscope, 50Ω coax cable, and a 50Ω feedthru are needed for this procedure (figure 2-1). Preset the generator front panel controls as follows:

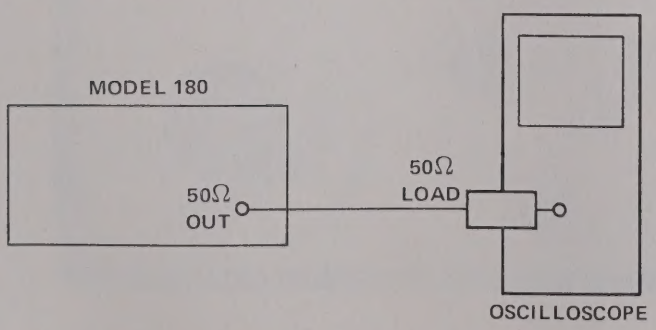


Figure 2-1. Acceptance Check Setup

Control	Position
FREQ MULT	PWR OFF
Frequency Dial	1.0
Function	∿
AMPLITUDE	Full clockwise
DC OFFSET	OFF
SWEEP WIDTH	OFF
SWEEP RATE	9 o'clock

Perform the steps in table 2-1; monitor the 50Ω OUT HI connector at the oscilloscope.

2.4 CHANGING THE OUTPUT IMPEDANCE

The output impedance is normally:

HI 50Ω @ 10V p-p
LO 50Ω @ 1V p-p

Attenuation is normally 0 - 30 dB. Lowest possible amplitude is −50 dB.

If simultaneous 600Ω and 50Ω output impedances are desired:

1. Change value of R145 from 499Ω to 604Ω.

2. Remove R147.

The result is:

HI 50Ω @ 10V p-p
LO 600Ω @ 10V p-p (low power)

Attenuation is 0 - 30 dB. Lowest possible amplitude is −30 dB. Square wave rise and fall is ≤ 150 ns.

If 50Ω and any other impedance greater than 600Ω are desired, replace R145 with resistor of that value.

If 50 dB of attenuation control is desired in a modified instrument, change R121 from 33.2Ω to 1.8Ω. Waveform quality above 20 kHz will be considerably impaired at −50 dB compared to a standard instrument.

Table 2-1. Acceptance Check

Step	Control	Position/Operation	Observe at 50Ω OUT
1	FREQ MULT	X 1 (Model 180) X .1 (Model 180LF)	1 Hz, 10V p-p sine wave (Model 180) 0.1 Hz, 10V p-p sine wave (Model 180LF)
2	FREQ MULT	X 1, X 10, X 100, - - - X 1M (as applicable)	Frequency increases by a decade for every change of switch position
3	FREQ MULT	X 1K	– – –
4	Function	∿	Triangle wave
5	Function	⊓	Square wave
6	AMPLITUDE	ccw	Decrease in waveform amplitude
7	DC OFFSET	cw	Positive slew of waveform from full negative offset
8	DC OFFSET	ccw	Negative slew of waveform
9	DC OFFSET	OFF	– – –
10	AMPLITUDE	Full cw	– – –
11	Dial	Full cw	– – –
12	SWEEP WIDTH	Full cw	Frequency of waveform repetitively sweeps

SECTION 3
OPERATION

3.1 CONTROLS AND CONNECTORS

The generator front panel controls and connections shown in figure 3-1 are keyed by circled numbers to the following descriptions.

3.1.1 Power/Frequency Controls

(1) FREQ MULT/PWR OFF

Power is turned on when frequency range is selected at the FREQ MULT (Hz) control. The ranges multiplied by frequency dial (2) settings determine output frequency. The frequency dial index lights when power is turned on.

(2) Frequency Dial

Frequency dial settings multiplied by frequency range (1) determine output frequency.

(3) VCG IN Connector

Voltage controlled generator input (VCG IN) dc excursions proportionally control frequency within a selected range. Positive inputs increase frequencies set by the frequency dial and range control; negative inputs decrease the frequencies.

(4) GCV OUT Connector

Generator controlled voltage output (GCV OUT) dc excursions of 0V to about 2V proportionally represent output frequency within a given range.

3.1.2 Amplitude Controls

(5) DC OFFSET

Rotating the DC OFFSET control clockwise offsets dc center reference of waveform positive; when

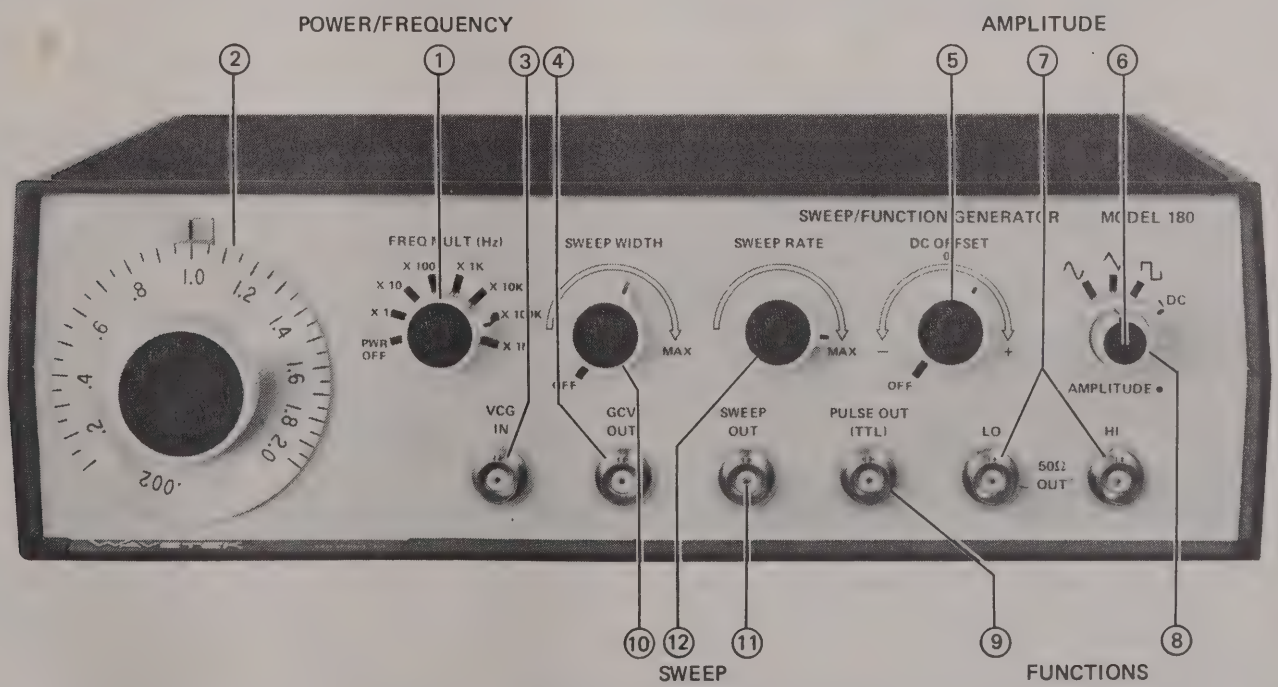


Figure 3-1. Model 180 Controls and Connectors

counterclockwise, negative. When OFF, the waveform is balanced around signal ground (figure 3-2).

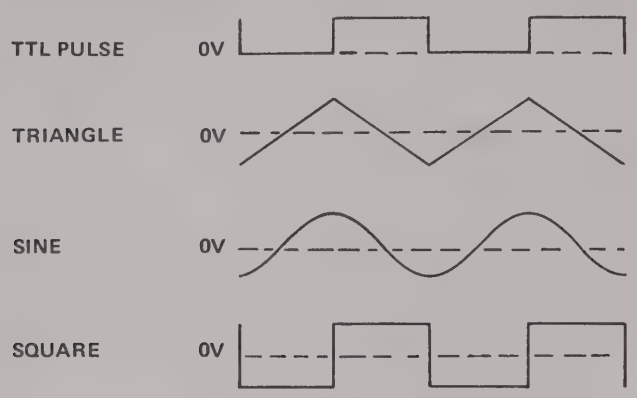


Figure 3-2. Output Waveforms

⑥ AMPLITUDE

Rotating the AMPLITUDE control fully clockwise provides maximum peak-to-peak output at the 50Ω OUT connectors; counterclockwise for up to 30 dB attenuation of output amplitude.

⑦ 50Ω OUT Connectors

Maximum output of 10V p-p signals into a 50Ω load (20V p-p open circuit) is provided at the 50Ω OUT HI connector, and 20 dB below (1/10 or a 1V p-p maximum) of that level at the 50Ω OUT LO connector.

3.1.3 Function Selections

⑧ ∿ , ∿ , ⊓ , and DC (Waveforms)

Sine ∿ , triangle ∿ , and square ⊓ waveforms are selected by the larger of the two concentric controls; the DC position provides a dc voltage output of the waveform center reference level at the 50Ω OUT ⑦ connectors.

⑨ TTL PULSE OUT Connector

A fixed amplitude Transistor-Transistor Logic (TTL) square pulse train of the output frequency is provided at the PULSE OUT (TTL) connector. (TTL levels are 0V to 0.4V for a logic low and 2.4V to 5V for a logic high.) The output can drive up to 20 TTL loads. The pulse train can also be used as a synchronizing reference for the main output ⑦ . Phase of the waveforms relative to the TTL pulse is shown in figure 3-2.

3.1.4 Sweep Controls

⑩ SWEEP WIDTH/OFF

Main output (at 50Ω OUT HI or LO) frequency sweep is turned on when SWEEP WIDTH is rotated past OFF. Rotation of the control varies the peak amplitude of an internal ramp signal (seen at GCV OUT) whose voltage controls the frequency of the main generator (seen at 50Ω OUT). See figure 3-3.

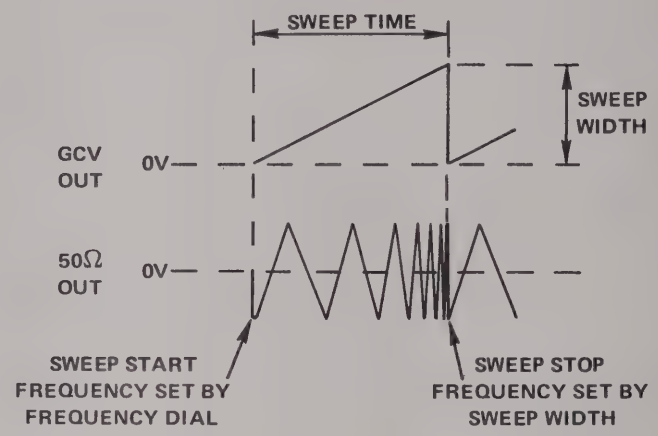


Figure 3-3. Effect of Sweep on Output Frequency

⑪ SWEEP OUT Connector

The sweep generator ramp is available at the SWEEP OUT connector. Amplitude is 0V to 5V peak (600Ω source impedance).

⑫ SWEEP RATE

Rotation of SWEEP RATE controls duration of the sweep voltage ramp, and thus frequency of sweep repetition.

3.2 OPERATION

Operation can be quite varied but is described here as manual, voltage controlled or sweep controlled. The generator is ready to operate as soon as a frequency multiplier is selected; however, when output is critical, allow ½ hour warm up.

3.2.1 Signal Termination

Proper signal termination, or loading, of the generator connectors is necessary for its specified operation. For example, the proper termination of the main output is shown in figure 3-4. Placing the 50 ohm terminator, or 50 ohm resistance, in parallel with a higher impedance, matches the receiving instrument input impedance to the generator

output impedance, thereby minimizing signal reflection or power loss on the line due to impedance mismatch.

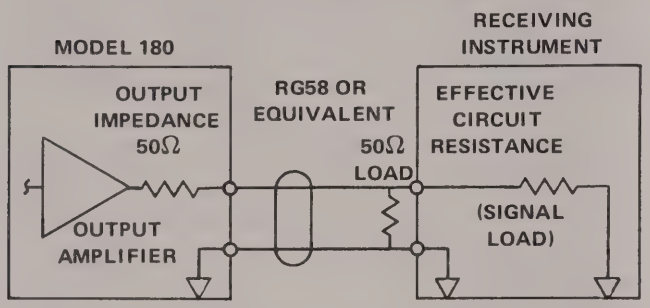


Figure 3-4. Signal Termination

The input and output impedances of the generator connectors are listed below:

Connector	Impedance
50Ω OUT HI	50Ω
50Ω OUT LO	50Ω
PULSE OUT (TTL)	*
SWEEP OUT	600Ω
VCG IN	2 kΩ
GCV OUT	600Ω

*The PULSE OUT connector can drive up to 20 Transistor-Transistor Logic (TTL) loads (low level between 0V and 0.4V, and high level between 2.4V and 5V).

3.2.2 Manually Controlled Operation

For basic operation, select the waveform to be output, and set the output signal frequency and amplitude. The following steps demonstrate manual control of the function generator:

Step	Control/Connector	Setting
1	50Ω OUT	Connect circuit to either HI or LO output (Ref: paragraph 3.2.1).
2	FREQ MULT	Set to desired range of frequency.
3	Frequency Dial	Set to desired frequency.
4	Waveform Selector	Set to desired waveform.
5	DC OFFSET	See figure 3-5.
6	AMPLITUDE	Select desired amplitude.

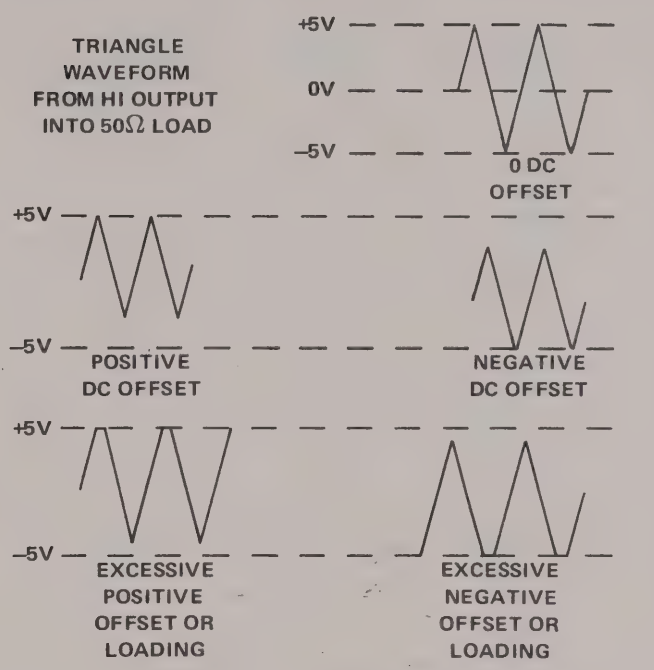


Figure 3-5. DC OFFSET Control

3.2.3 Voltage Controlled Operation

Operation as a voltage controlled function generator (VCG) is as for a manually controlled function generator, only the frequency within particular ranges is additionally controlled with dc levels (±2V excursions) injected at the VCG IN connector. Perform the steps given in paragraph 3.2.2, only set the frequency dial to determine a reference from which the frequency is to be voltage controlled:

1. For frequency control with positive dc inputs at VCG IN, set the dial for a lower frequency limit.

2. For frequency control with negative dc inputs at VCG IN, set the dial for an upper frequency limit.

3. For modulation with an ac input at VCG IN, center the dial at the desired center frequency. Do not exceed the maximum dynamic range of the selected frequency range.

Figure 3-6 is a nomograph with examples of the frequency dial effect as a reference for VCG IN voltages. Example 1 shows that with 0V VCG input, frequency is as determined by the main dial setting, 1.0 in this example. Example 2 shows that with a positive VCG input, output frequency is increased. Example 3 shows that with a negative VCG input, output frequency is decreased. (Note that the 50Ω OUT Frequency Factor column value must be multiplied by a frequency range multiplier to give the actual 50Ω OUT frequency.)

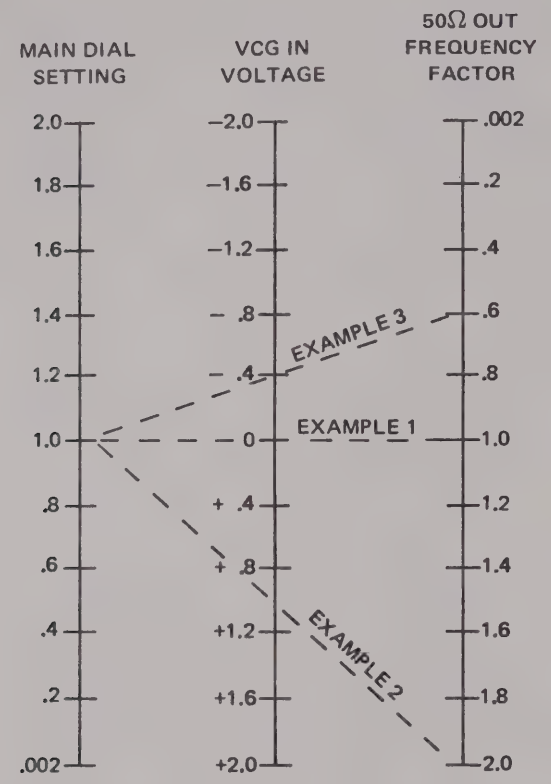


Figure 3-6. VCG Voltage-to-Frequency Nomograph

NOTE

Nonlinear operation results when the VCG input voltage is excessive; that is, when the attempted generator frequency exceeds the range setting (2 times the multiplier setting) or in the other direction, 1/1000th of the range setting.

The up to 1000:1 VCG sweep of the generator frequencies available in each range results from a 2V excursion at the VCG IN connector. With the frequency dial set to 2.0, excursions between −2V and 0V at VCG IN provide the up to 1000:1 frequency sweep. With the dial set to .002, excursions between 0V and +2V at VCG IN provide the up to 1000:1 sweep within the set frequency range.

3.2.4 Sweep Generator Operation

Operation as a sweep generator is like operation as a manual function generator, only the frequency is automatically and repetitively swept from the set frequency to a higher frequency. Actually, an internally generated positive-going voltage ramp (available at the SWEEP OUT connector) can be modified in amplitude and used like a VCG input voltage to sweep the output frequency (see figure 3-3). Perform the steps in paragraph 3.2.1 and the following steps for use as a sweep generator:

Step	Control/Connector	Setting
1	SWEEP WIDTH	As desired. This determines the upper frequency of the sweep.
2	SWEEP RATE	As desired. This determines the speed of the sweep.

NOTE

To monitor the ramp generator, use the SWEEP OUT connector. To monitor the frequency of the main generator, use the GCV OUT connector, which is a voltage proportional to the generator frequency.

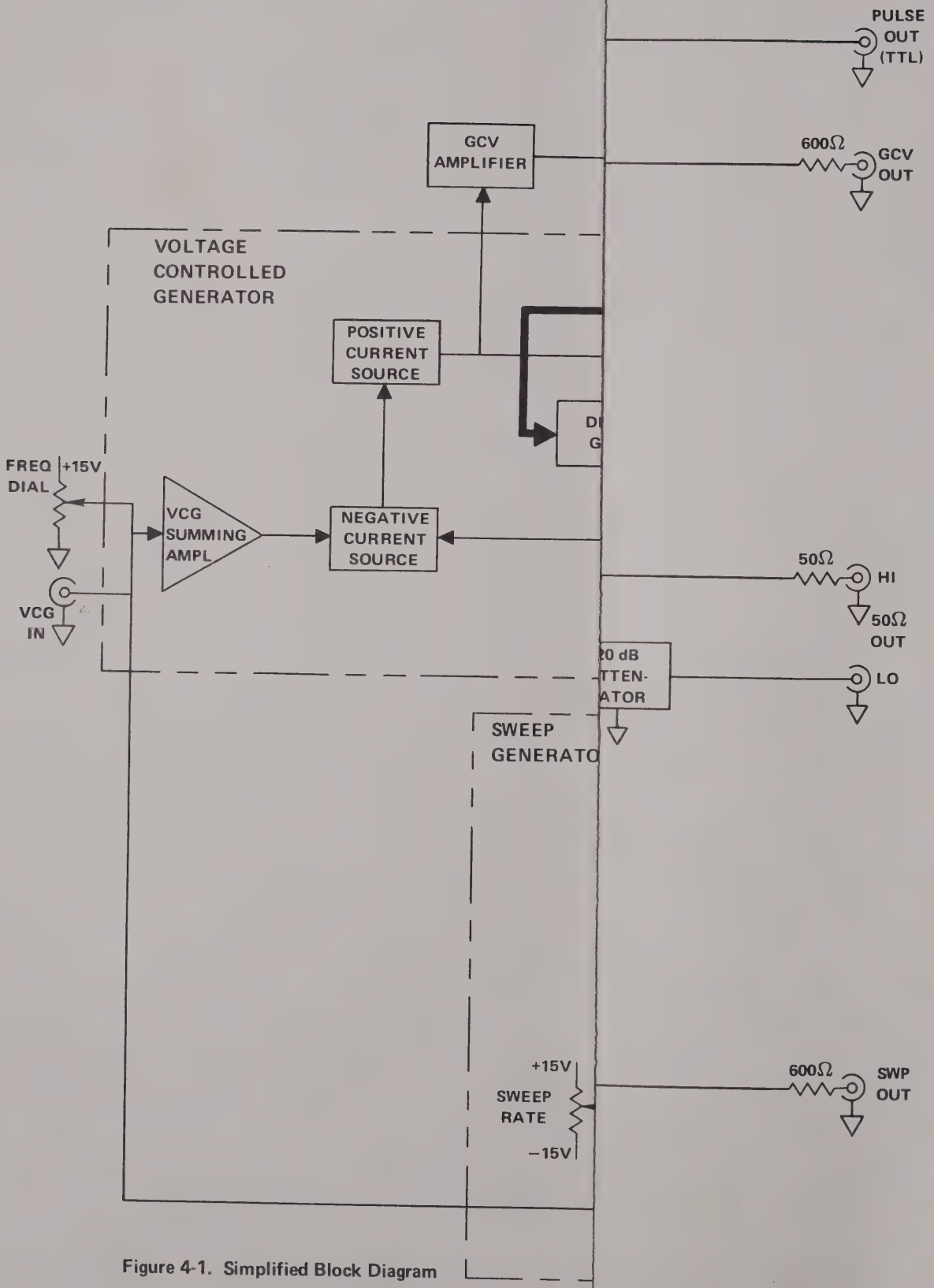


Figure 4-1. Simplified Block Diagram

SECTION 4
CIRCUIT DESCRIPTION

4.1 VOLTAGE CONTROLLED GENERATOR (VCG)

As shown in figure 4-1, the VCG summing amplifier sums the currents from the frequency dial, sweep generator, crystal control and VCG input connector. The VCG summing amplifier is an inverting amplifier whose output current is used to control a positive current source and a negative current source. The currents from the two current sources are equal and opposite polarity and the magnitudes are directly proportional to the current of the VCG summing amplifier output. The diode gate, which is controlled by the hysteresis switch, is used to switch the positive current or the negative current to the integrating capacitor selected by the frequency multiplier. If the positive current is switched into the capacitor, the voltage across the capacitor will increase linearly to generate the positive slope of the triangle wave. If the current is negative, the voltage across the capacitor will decrease linearly to produce the negative slope.

The triangle buffer amplifier is a unity gain amplifier whose output is fed to the hysteresis switch as well as to the sine converter. The hysteresis switch has two voltage limit points (+1.25V and −1.25V). (See figure 4-2.)

During the time the output voltage of the triangle buffer amplifier is increasing, the output voltage of the hysteresis switch is positive, but when the output voltage of the triangle amplifier reaches +1.25V, it triggers the hysteresis switch causing the switch output to become negative. Once the control voltage into the diode gate becomes negative, it will switch the positive current out and switch the negative current in to the integrating capacitor, starting a linear decrease of the voltage across the capacitor. When the decreasing voltage reaches −1.25V, the output of the hysteresis switch will switch back to positive, reversing the process. This action generates the triangle waveform as shown in figure 4-2. Since the output of the hysteresis switch is a square wave, the result is simultaneous generation of a square wave and triangle wave at the same frequency.

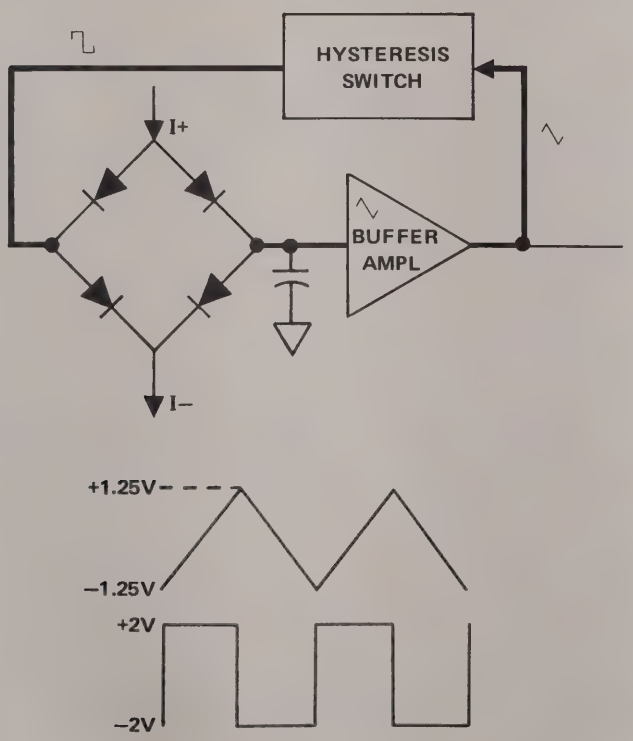


Figure 4-2. Simplified Timing Diagram

4.2 FREQUENCY CONTROL

The output frequency is determined by the magnitude of the integrating capacitor selected by the frequency multiplier and the magnitude of the positive and negative current sources (figure 4-1). Since the current magnitudes are linearly proportional to the sum of the VCG current, the output frequency will also be linearly proportional to the current sum.

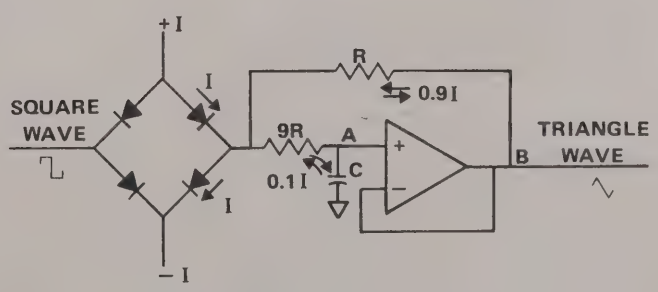
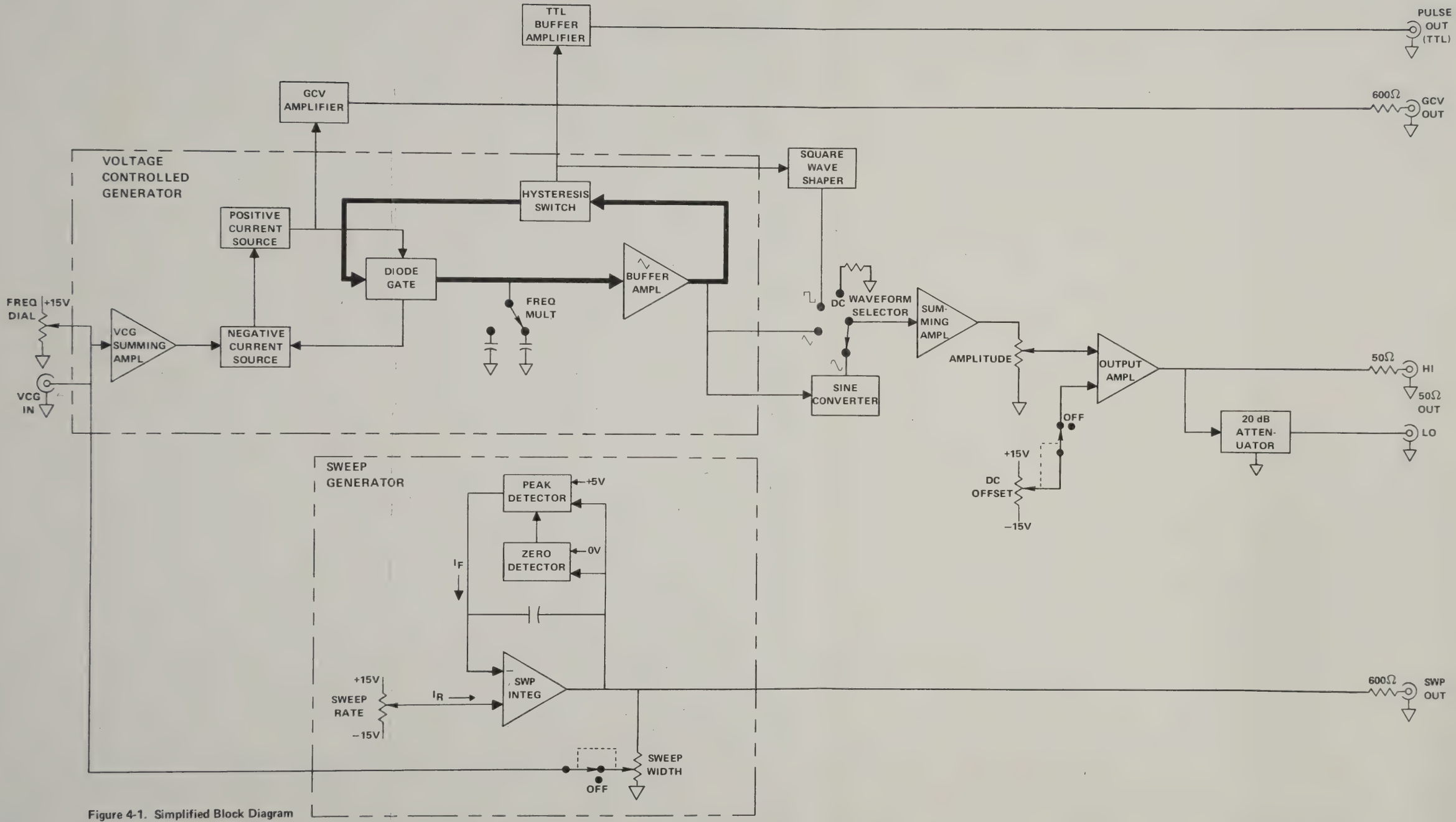


Figure 4-3. Current Divider



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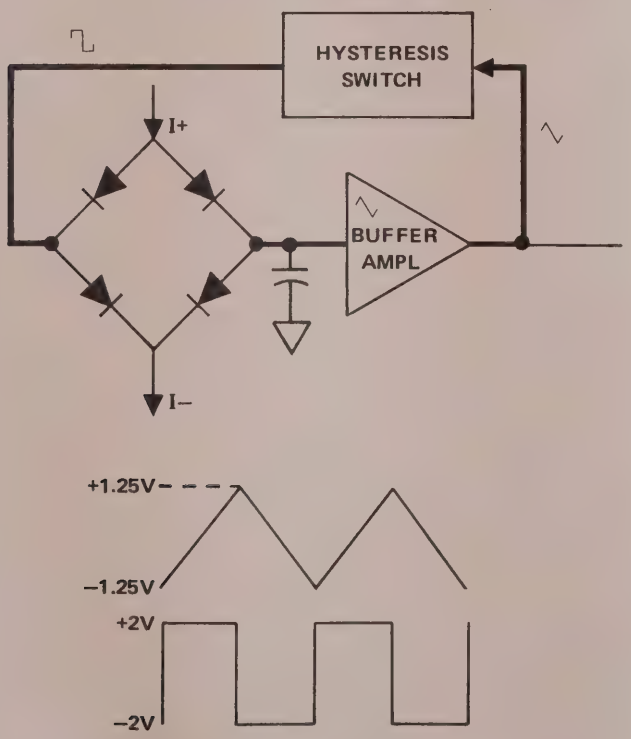

Figure 4-2. Simplified Timing Diagram

The triangle buffer amplifier is a unity gain amplifier whose output is fed to the hysteresis switch as well as to the sine converter. The hysteresis switch has two voltage limit points (+1.25V and −1.25V). (See figure 4-2.)

During the time the output voltage of the triangle buffer amplifier is increasing, the output voltage of the hysteresis switch is positive, but when the output voltage of the triangle amplifier reaches +1.25V, it triggers the hysteresis switch causing the switch output to become negative. Once the control voltage into the diode gate becomes negative, it will switch the positive current out and switch the negative current in to the integrating capacitor, starting a linear decrease of the voltage across the capacitor. When the decreasing voltage reaches −1.25V, the output of the hysteresis switch will switch back to positive, reversing the process. This action generates the triangle waveform as shown in figure 4-2. Since the output of the hysteresis switch is a square wave, the result is simultaneous generation of a square wave and triangle wave at the same frequency.

4.2 FREQUENCY CONTROL

The output frequency is determined by the magnitude of the integrating capacitor selected by the frequency multiplier and the magnitude of the positive and negative current sources (figure 4-1). Since the current magnitudes are linearly proportional to the sum of the VCG current, the output frequency will also be linearly proportional to the current sum.

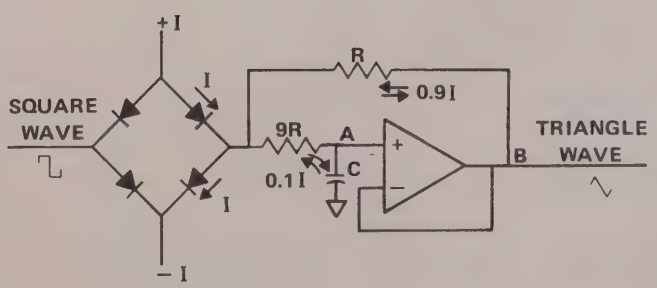

Figure 4-3. Current Divider

By using current division, the magnitude of the capacitor is effectively increased, allowing the generation of lower frequencies. Figure 4-3 is the simplified diagram showing current divider operation. By reducing integration current precisely by a factor of 10 while holding triangle wave amplitude constant, it is possible to extend the lower frequency range by a factor of 10 with fixed capacitance C. Since points A and B are at the equipotential points, constant current output I can be divided by resistance ratio of R and 9R. Then, integration current of capacitor C is reduced to 0.1 I. The lower current extends the frequency range of the function generator by a factor of 10. The same theory is applied to extend the frequency range by a factor of 100.

4.3 WAVEFORM OUTPUT

The inverted output of the hysteresis switch is fed to the TTL buffer amplifier and also the square wave shaper (figure 4-1). The square wave shaper consists of a shaping circuit which limits the output swing to ±1.25 volts.

The output signal from the triangle buffer amplifier is applied to the sine converter, which uses a diode-resistor network with linear sections to shape a sine wave.

The sine, triangle or square waveform is fed to the summing amplifier through the waveform selector switch. The output of summing amplifier is fed through the amplitude control to the output amplifier. The output amplifier is an inverting amplifier whose output is capable of driving 10V p-p into 50Ω load from 50Ω source impedance.

4.4 SWEEP CIRCUITS

Sweep rate control determines the amount of integrating current fed to the positive input of the sweep integrator (figure 4-1). The output voltage increases linearly as the sweep circuit capacitor is charged to form the positive slope of the ramp. As the ramp output reaches the preset level of +5V, the peak detector turns on while the positive feedback circuit holds the positive output state. The large flyback current I_F is fed to the negative input of the sweep integrator while overcoming minute integrating current I_R. Thus, the ramp output decreases rapidly toward the negative voltage, forming the negative slope of the ramp. When the negative slope reaches zero volts, the zero detector turns on, the peak detector is unlatched and the flyback current source is turned off, allowing the output voltage to increase linearly.

SECTION 5
CALIBRATION

5.1 FACTORY REPAIR

Wavetek maintains a factory repair department for those customers not possessing the necessary personnel or test equipment to maintain the instrument. If an instrument is returned to the factory for calibration or repair, a detailed description of the specific problem should be attached to minimize turnaround time.

5.2 REQUIRED TEST EQUIPMENT

Voltmeter
Distortion Analyzer
Oscilloscope
50Ω (±0.1%) Load
Counter (6 digit)

5.3 REMOVING GENERATOR COVER

Remove the four screws in the lower cover, place the instrument on its feet and lift off the top cover.

5.4 CALIBRATION

After referring to the following preliminary data, perform calibration, as necessary, per table 5-1. If performing partial calibration, check previous settings and adjustments for applicability.

1. Unless otherwise noted, all measurements made at the 50Ω OUT connector should be terminated into a 50Ω (⩽1%, 1W) load.

2. Before connecting the unit to an ac source, check the ac line circuit to make sure the 115/230 volt switch is set at the correct position (see paragraph 2.2).

3. Start the calibration by setting the front panel switches as follows:

Dial	2.0
FREQ MULT	X 1K
SWEEP WIDTH	OFF
SWEEP RATE	ccw
DC OFFSET	OFF
Function	∿
AMPLITUDE	cw

4. Allow the unit to warm up at least 30 minutes for final calibration.

Table 5-1. Calibration Chart

Step	Check	Tester	Cal Points	Control Setting	Adjust	Desired Results	Remarks
1	Power supply regulation	Voltmeter	TP2 (TP1 ground)		R9	+15 ±0.01V	
2			TP3			−15 ±0.05V	
3	Distortion	Distortion analyzer (50Ω terminated)	50Ω OUT HI		R78 R103	Minimum distortion	

Table 5-1. Calibration Chart (Continued)

Step	Check	Tester	Cal Points	Control Setting	Adjust	Desired Results	Remarks
4	VCG null	Scope (50Ω terminated)		FREQ MULT X 100K Function ⊓ Dial full cw Scope vert 2V/div Scope horiz .5 ms/div	R43	Minimum frequency shift	Adjust generator dial for 1 full square on scope. Alternately short and open VCG IN BNC while adjusting R43.
5	Horizontal symmetry			Scope X 10 on	R47	Maximum symmetry	Alternately switch scope triggering from positive to negative slope while adjusting R47.
6				Dial 0.1 FREQ MULT X 10 Scope sweep 0.1s/div DC triggering	R66	Maximum symmetry	For 180LF, FREQ MULT X 1. Scope sweep 1s/div.
7	Frequency accuracy	Counter (50Ω terminated)		Dial 2.0 FREQ MULT X 1 thru X 10K	R39	Best frequency accuracy over X 1 thru X 10K	
8				FREQ MULT X 1M Function ∿ ⋀ ⊓	C19	Best frequency accuracy for all waveforms	
9	DC level	Voltmeter (50Ω terminated)		FREQ MULT X 1K Function DC Amplitude ccw	R125	0 ±20 mVdc	

SECTION 6
TROUBLESHOOTING

6.1 FACTORY REPAIR

Wavetek maintains a factory repair department for those customers not possessing the necessary personnel or test equipment to maintain the instrument. If an instrument is returned to the factory for calibration or repair, a detailed description of the specific problem should be attached to minimize turnaround time.

6.2 TROUBLESHOOTING CHART

Troubleshooting charts are given in figure 6-1. The charts do not cover every possible trouble, but will be an aid in systematically isolating faulty components.

6.3 TROUBLESHOOTING INDIVIDUAL COMPONENTS

6.3.1 Transistor

1. A transistor is defective if more than one volt is measured across its base emitter junction in the forward direction.

2. A transistor when used as a switch may have a few volts reverse bias voltage.

3. If the collector and emitter voltages are the same, but the base emitter voltage is less than 500 mV forward voltage (or reversed bias), the transistor is defective.

4. A transistor is defective if its base current is larger than 10% of its emitter current (calculate currents from voltage across the base and emitter series resistors).

5. In a transistor differential pair (common emitter stages), either their base voltages are the same in normal operating condition, or the one with less forward voltage across its base emitter junction should be off (no collector current); otherwise, one of the transistors is defective.

6.3.2 Diode

1. A diode is defective if there is greater than one volt (typically 0.7 volt) forward voltage across it.

6.3.3 Operational Amplifier (e.g., UA741C, LM318)

1. The "+" and "–" inputs of an operational amplifier will have less than 15 mV voltage difference when operating under normal conditions.

2. If the output voltage stays at maximum positive, its "+" input voltage should be more positive than its "–" input voltage, or vice versa; otherwise, the operational amplifier is defective.

6.3.4 Capacitor

1. Shorted capacitors have zero volts across their terminals.

2. Opened capacitor can be located (but not always) by using a good capacitor connected in parallel with the capacitor under test and observing the resulting effect.

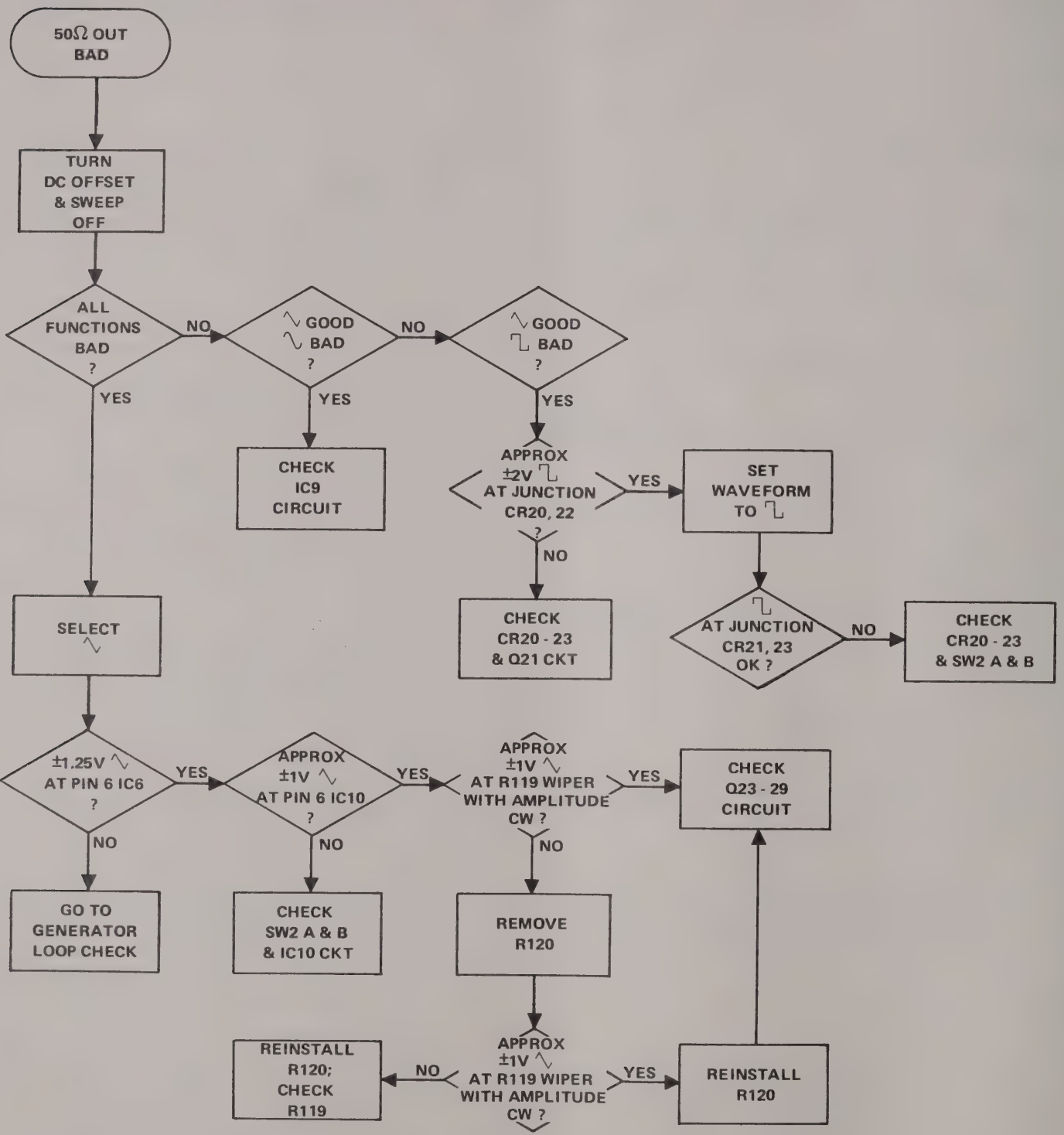

Figure 6-1. Troubleshooting Chart (Sheet 1 of 4)

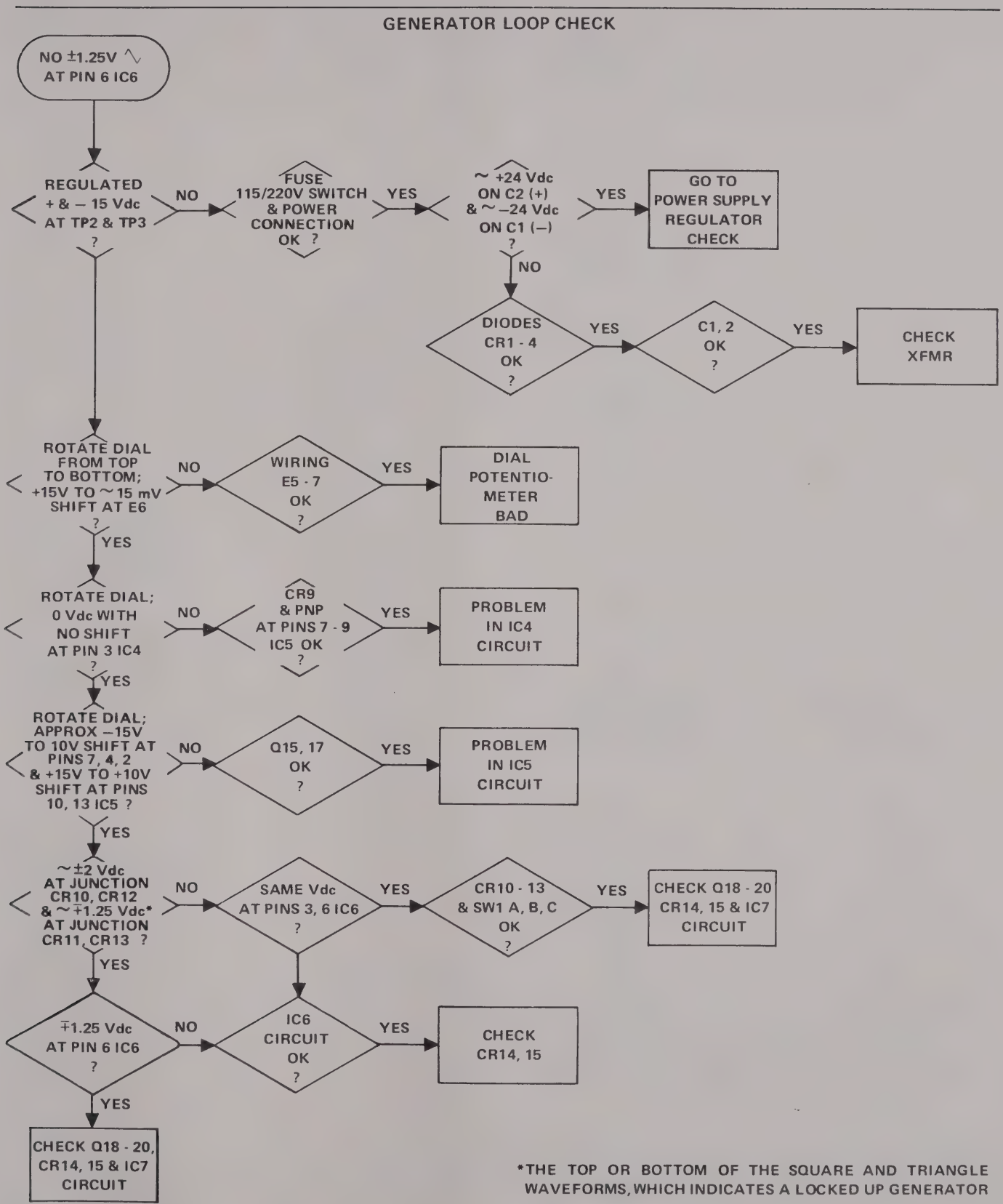
GENERATOR LOOP CHECK
NO ±1.25V ∿ AT PIN 6 IC6
REGULATED + & – 15 Vdc AT TP2 & TP3 ?
NO
FUSE 115/220V SWITCH & POWER CONNECTION OK ?
YES
~ +24 Vdc ON C2 (+) & ~ –24 Vdc ON C1 (–) ?
YES
GO TO POWER SUPPLY REGULATOR CHECK
NO
DIODES CR1 - 4 OK ?
YES
C1, 2 OK ?
YES
CHECK XFMR
ROTATE DIAL FROM TOP TO BOTTOM; +15V TO ~15 mV SHIFT AT E6 ?
NO
WIRING E5 - 7 OK ?
YES
DIAL POTENTIO-METER BAD
YES
ROTATE DIAL; 0 Vdc WITH NO SHIFT AT PIN 3 IC4 ?
NO
CR9 & PNP AT PINS 7 - 9 IC5 OK ?
YES
PROBLEM IN IC4 CIRCUIT
YES
ROTATE DIAL; APPROX –15V TO 10V SHIFT AT PINS 7, 4, 2 & +15V TO +10V SHIFT AT PINS 10, 13 IC5 ?
NO
Q15, 17 OK ?
YES
PROBLEM IN IC5 CIRCUIT
YES
~ ±2 Vdc AT JUNCTION CR10, CR12 & ~ ∓1.25 Vdc* AT JUNCTION CR11, CR13 ?
NO
SAME Vdc AT PINS 3, 6 IC6 ?
YES
CR10 - 13 & SW1 A, B, C OK ?
YES
CHECK Q18 - 20 CR14, 15 & IC7 CIRCUIT
YES
∓1.25 Vdc AT PIN 6 IC6 ?
NO
IC6 CIRCUIT OK ?
YES
CHECK CR14, 15
YES
CHECK Q18 - 20, CR14, 15 & IC7 CIRCUIT
*THE TOP OR BOTTOM OF THE SQUARE AND TRIANGLE WAVEFORMS, WHICH INDICATES A LOCKED UP GENERATOR

Figure 6-1. Troubleshooting Chart (Sheet 2 of 4)

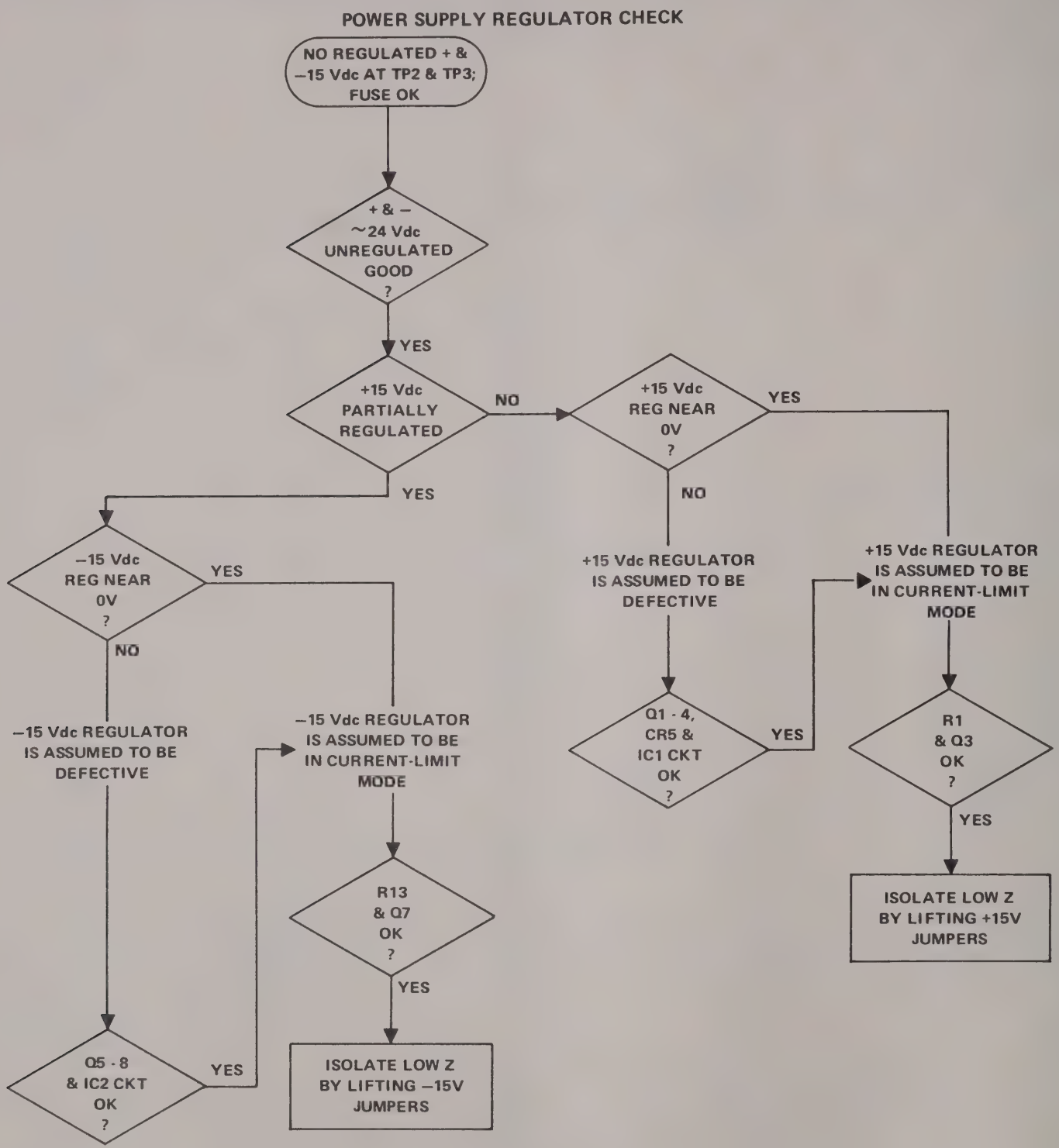
POWER SUPPLY REGULATOR CHECK
NO REGULATED + & −15 Vdc AT TP2 & TP3; FUSE OK
+ & − ~24 Vdc UNREGULATED GOOD ?
YES
+15 Vdc PARTIALLY REGULATED
NO
+15 Vdc REG NEAR 0V ?
YES
YES
NO
−15 Vdc REG NEAR 0V ?
YES
NO
+15 Vdc REGULATOR IS ASSUMED TO BE DEFECTIVE
+15 Vdc REGULATOR IS ASSUMED TO BE IN CURRENT-LIMIT MODE
−15 Vdc REGULATOR IS ASSUMED TO BE DEFECTIVE
−15 Vdc REGULATOR IS ASSUMED TO BE IN CURRENT-LIMIT MODE
Q1 - 4, CR5 & IC1 CKT OK ?
YES
R1 & Q3 OK ?
YES
ISOLATE LOW Z BY LIFTING +15V JUMPERS
R13 & Q7 OK ?
YES
ISOLATE LOW Z BY LIFTING −15V JUMPERS
Q5 - 8 & IC2 CKT OK ?
YES

Figure 6-1. Troubleshooting Chart (Sheet 3 of 4)

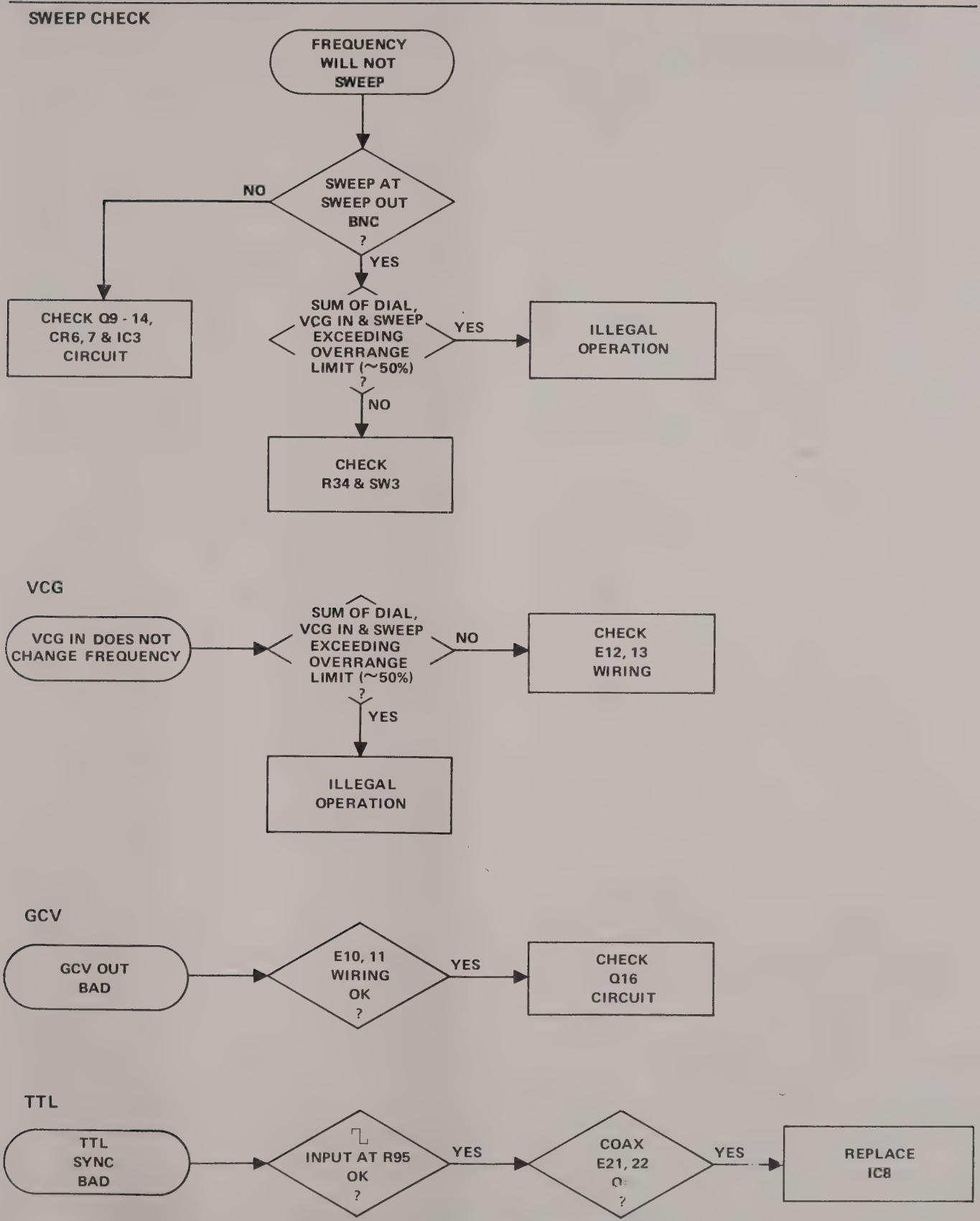

Figure 6-1. Troubleshooting Chart (Sheet 4 of 4)

SECTION 7
PARTS AND SCHEMATICS

7.1 DRAWINGS

The following assembly drawings (with parts lists) and schematics are in the arrangement shown below.

7.2 ORDERING PARTS

When ordering spare parts, please specify part number, circuit reference, board, serial number of unit, and if applicable, the function performed.

7.3 ADDENDA

Under Wavetek's product improvement program, the latest electronic designs and circuits are incorporated into each Wavetek instrument as quickly as development and testing permit. Because of the time needed to compose and print instruction manuals, it is not always possible to include the most recent changes in the initial printing. Whenever this occurs, addendum pages are prepared to summarize the changes made and are inserted immediately inside the rear cover. If no such pages exist, the manual is correct as printed.

	Page No.
CHASSIS	
Schematic	7-2
Assembly Drawing	7-3
Model 180 Parts List	7-4
Model 180LF Parts List	7-5
MAIN BOARD	
Schematic	7-6
Assembly Drawing	7-7
Model 180 Parts List	7-8
Model 180LF Parts List	7-10

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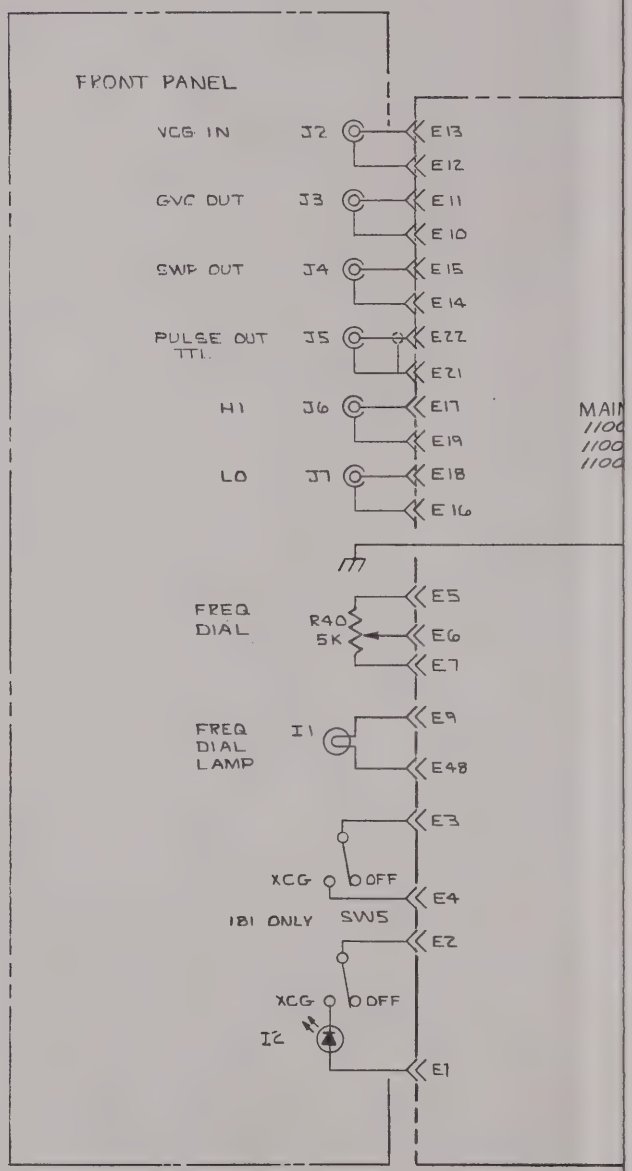

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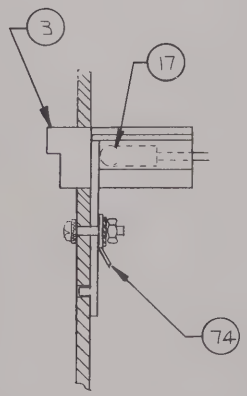

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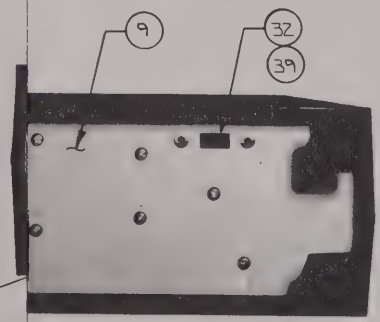

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MODEL 180-181 MODEL 180LF

X1M
X100K
X10K
X1K
X100
X10
X1
PWR OFF

X100K
X10K
X1K
X100
X10
X1
X.1
PWR OFF

FRONT PANEL

VCG IN J2 E13 E12
GVC OUT J3 E11 E10
SWP OUT J4 E15 E14
PULSE OUT TTL J5 E22 E21
HI J6 E17 E19
LO J7 E18 E16

MAIN BD.
1100-00-0120
1100-00-0121
1100-00-0122

E39 E41 E40

T1
130-500

SW1
SW1-E
SW1-F
115/230

F1
FUSE
1/4A SB (115VAC)
1/8A SB (230VAC)

RED
BLK
BLK/WHT
RED/WHT
GRY
RED
GRY/WHT
GRN/YEL
GRN/YEL

FREQ DIAL R40 5K E5 E6 E7
FREQ DIAL LAMP I1 E9 E48
XCG OFF E3 E4
181 ONLY SW5
XCG OFF E2
I2 E1

E32 E33 E34 E35 E36 E37 E31 E29 E30 E38 E28 E23 E24 E42 E26 E27

P1
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

XCG BD.
MODEL 181 ONLY

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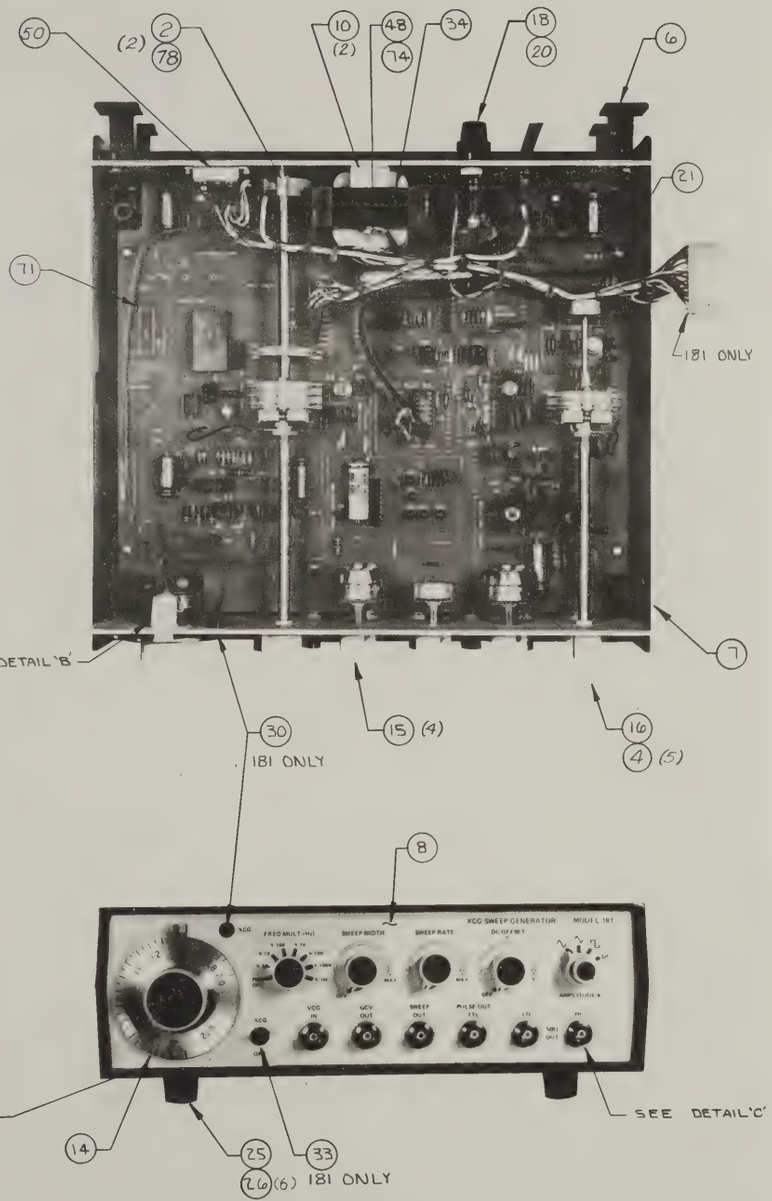

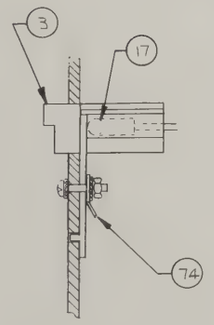

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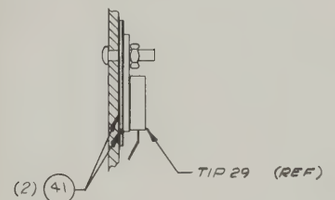
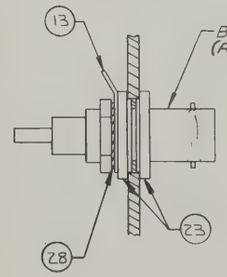


APPLY COMPOUND TO BOTH SIDES OF INSULATOR.

DETAIL A



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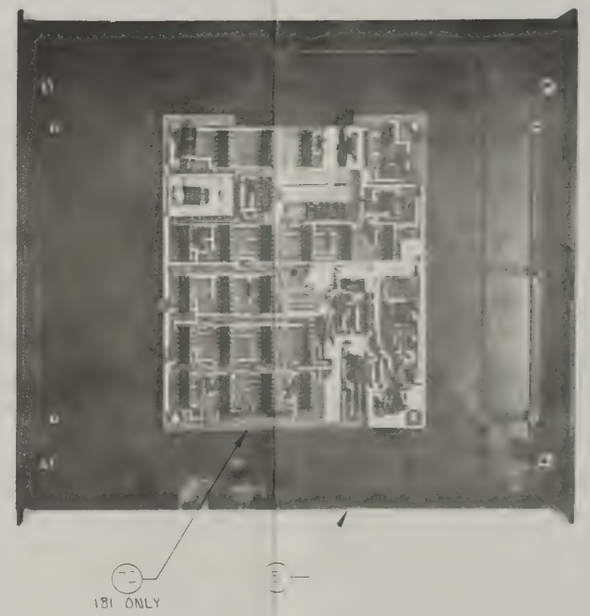

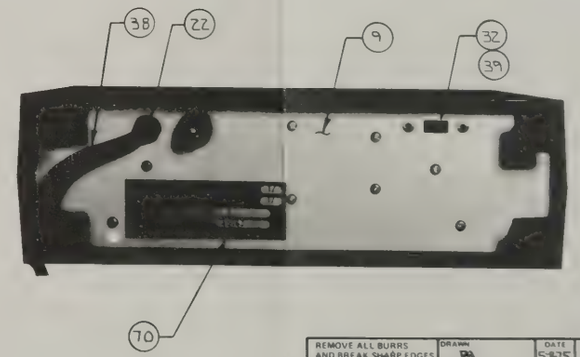

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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
50	TERM,LOCK LUG	1414-6	SMITH	2100-04-0009	1
13	SOLDER LUG	1497	SMITH	2100-04-0012	6
15	STD KNOB	KB-67-1-SB-M	KOGAN	2400-01-0008	4
16	COAX KNOB SET	KB-67-1-SB+0-M-9	KOGAN	2400-01-0009	1
17	LAMP	CM7-7876	CHMIN	2400-02-0013	1
18	FUSE,125V,1/4A,SB	313.250	LITFU	2400-05-0008	1
20	FUSE HOLD	345001	LITFU	2400-05-0012	1
8	BUSHING NYLINER	4L2FF	THOMN	2600-01-0002	5
NONE	STANDOFF	1443-M03-F05-440	UNICP	2800-02-0009	4
25	BAIL ASSY W/FT	180-500	WVTK	2800-08-0010	1
26	SPEEDNUT,SELF RETAIN	C7494-632-4	TINN	2800-09-0003	6
23	WASHER,SHOULDER	2668	SMITH	2800-27-0004	12
22	STRAIN RELIEF BUSH	SR6R-1	HEYCO	2800-37-0003	1
78	WAFER	130-SW1-3	WVTK	5104-02-0007	2
32	SWITCH ASSY SLIDE	46256-LF	SWCFT	5105-00-0002	1
89	SOLDER GUARD	46256-LF-SG	SWCFT	5105-09-0001	1
38	PWR CORD	0-7789-006-GY	PACRD	6001-80-0004	1

WAVETEK PARTS LIST	TITLE STD CHASSIS	ASSEMBLY NO. 1101-00-0048 PAGE: 2	REV C

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REFERENCE	MFGR	WAVETEK NO.	QTY/PT
NONE	SMITH	2100-04-0009	1
14	SMITH	2100-04-0012	6
34	KOGAN	2400-01-000A	4
2	KOGAN	2400-01-0009	1
41	CHKIN	2400-02-0015	1
77	LITFU	2400-05-000A	1
3	LITFU	2400-05-0012	1
5	THUMN	2800-01-0002	5
6	UNICP	2800-02-0009	4
7	AVTA	2800-08-0010	1
8	TINN	2800-0A-0003	6
	SMITH	2800-27-0004	12
9	METCO	2800-37-0003	1
10	AVIK	5104-02-0007	2
70	SACFT	5105-00-0002	1
NONE	SACFT	5105-09-0001	1
J2 J3 J	PACRD	6001-80-0004	1
74			

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	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		MODEL NO. 180LF / DWG NO. 1101-00-0050 / REV C
	DO NOT SCALE DWG		CODE IDENT 23338 / SHEET OF
	SCALE		

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	OWIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	ASSY DRWG,CHASSIS	0102-00-0307	WVTK	0102-00-0307	1
14	DIAL ASSY	180-027	WVTK	1201-00-0027	1
34	TRANSFORMER	130-500	WVTK	1204-00-0478	1
2	SPACER	R480	WVTK	1400-00-0653	2
41	INSULATOR,MICA	142-311	WVTK	1400-00-2080	2
77	PLATE,NAME	139-305	WVTK	1400-00-2180	1
3	INDICATOR,DIAL	180-303	WVTK	1400-00-4970	1
5	COVER,TOP	180-300-1	WVTK	1400-00-5000	1
6	POST	180-302	WVTK	1400-00-5020	4
7	COVER,BOTTOM	180-300-2	WVTK	1400-00-5030	1
8	PANEL,FRONT FROM:1400-00-5042	180-305-1	WVTK	1400-00-5059	1
9	PANEL,REAR	180-306	WVTK	1400-00-5073	1
10	BLOCK,MTG	180-309	WVTK	1400-00-5083	2
70	TAG,SERIAL	180-318	WVTK	1400-00-5390	1
NONE	CORD HOLDER	1400-00-5409	WVTK	1400-00-5409	1
J2 J3 J4 J5 J6 J7	BNC CONN	KC-7946	KING	2100-01-0002	6
74	TERM,LOCK LUG	1414-4	SMITH	2100-04-0008	1

WAVETEK PARTS LIST	TITLE STD CHASSIS	ASSEMBLY NO. 1101-00-0048 PAGE: 1	REV C

REFERENCE DESIGNATORS	PART DESCRIPTION	OWIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
50	TERM,LOCK LUG	1414-6	SMITH	2100-04-0009	1
13	SOLDER LUG	1497	SMITH	2100-04-0012	6
15	STD KNOB	MB-67-1-S8-M	MOGAN	2400-01-0008	4
16	COAX KNOB SET	MB-67-1-S8+0-M-9	MOGAN	2400-01-0009	1
17	LAMP	CM7-7676	CMMIN	2400-02-0013	1
18	FUSE,125V,1/4A,SB	313.250	LITFU	2400-05-0008	1
20	FUSE MOLD	345001	LITFU	2400-05-0012	1
4	BUSHING NYLINER	4L2FF	THOMN	2800-01-0002	5
NONE	STANDOFF	1443-M03-F05-040	UNICP	2800-02-0009	4
25	BAIL ASSY W/FT	180-500	WVTK	2800-08-0010	1
26	SPEEDNUT,SELF RETAIN	C7494-632-4	TINN	2800-09-0003	6
23	WASHER,SHOULDER	266A	SMITH	2800-27-0004	12
22	STRAIN RELIEF BUSH	SR6A-1	HEYCO	2800-37-0003	1
78	WAFER	130-SR1-3	WVTK	5104-02-0007	2
32	SWITCH ASSY SLIDE	4625E-LF	SWCFT	5105-00-0002	1
39	SOLDER GUARD	4625A-LF-SG	SWCFT	5105-09-0001	1
38	PWR CORD	0-7789-006-GY	PACRD	6001-80-0004	1

WAVETEK PARTS LIST	TITLE STD CHASSIS	ASSEMBLY NO. 1101-00-0048 PAGE: 2	REV C

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE STD CHASSIS MODEL 180
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		MODEL NO 180
	DO NOT SCALE DWG		DWG NO. 1101-00-0048
	SCALE		REV C
			CODE IDENT 23338 SHEET OF

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND DESIGN RIGHTS BELONGING TO WAVETEK AND MAY NOT BE REPRODUCED FOR ANY REASON EXCEPT CALIBRATION, OPERATION, AND MAINTENANCE WITHOUT WRITTEN AUTHORIZATION.

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	ASSY DRAG,CHASSIS	0102-00-0307	WVTK	0102-00-0307	1
14	DIAL ASSY	180-027	WVTK	1201-00-0027	1
34	TRANSFORMER	130-500	WVTK	1204-00-0078	1
2	SPACER	AR60	WVTK	1400-00-0643	2
41	INSULATOR,MICA	142-411	WVTK	1400-00-2080	2
77	PLATE,NAME	139-305	WVTK	1400-00-2180	1
3	INDICATOR,DIAL	160-303	WVTK	1400-00-4970	1
5	COVER,TOP	180-300-1	WVTK	1400-00-5000	1
6	POST	180-302	WVTK	1400-00-5020	4
7	COVER,BUTTON	180-300-2	WVTK	1400-00-5030	1
8	PANEL,FRONT FROM:1400-00-5042	180-305-1	WVTK	1400-00-5059	1
9	PANEL,REAR	180-306	WVTK	1400-00-5073	1
10	BLOCK,MTG	180-309	WVTK	1400-00-5083	2
70	TAG,SERIAL	180-318	WVTK	1400-00-5390	1
NONE	CORD HOLDER	1400-00-5409	WVTK	1400-00-5409	1
J2 J3 J4 J5 J6 J7	BNC CONN	MC-794A	KING	2100-01-0002	6
74	TERM,LOCK LUG	1414-4	SMITH	2100-04-0004	1

WAVETEK PARTS LIST	TITLE STD CHASSIS	ASSEMBLY NO. 1101-00-0050 PAGE: 1	REV C

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
50	TERM,LOCK LUG	1414-4	SMITH	2100-04-0004	1
13	SOLDER LUG	1427	SMITH	2100-04-0012	6
15	STD KNOB	MS-E7-1-SP-**	MCGAR	2400-01-0004	4
16	CLAM KNOB SET	MS-E7-1-SA-****	MCGAR	2400-01-0004	1
17	CLAMP	C-7-A-7	CAMLOK	2400-02-0013	1
18	FUSE,125V,1/4A,SB	313.250	LITFU	2400-05-0004	1
20	FUSE HOLD	342001	LITFU	2400-05-0012	1
4	BUSHING NYLIRON	NL2FF	THO M	2800-01-0002	5
NONE	STANDOFF	1403-A03-F05-B4C	UNICP	2800-02-0009	4
25	RAIL ASSY W/FT	180-300	WVTK	2800-32-0010	1
26	SPEEDNUT,SELF RETAIN	C7444-F32-2	TINN	2800-04-0003	6
23	WASHER,SHOULDER	2808	SMITH	2800-27-0004	12
22	STRAIN RELIEF BUSH	SR07-1	HEYCO	2800-37-0003	1
78	WAFER	136-SW1-3	WVTK	5104-02-0007	2
32	SWITCH ASSY SLIDE	4825E-LF	SWCFT	5105-00-0002	1
39	SOLDER GUARD	4 250-LF-SG	SWCFT	5105-04-0001	1
38	PWR CORD	6-7764-008-6Y	PACKD	6001-80-0004	1

WAVETEK PARTS LIST	TITLE STD CHASSIS	ASSEMBLY NO. 1101-00-0050 PAGE: 2	REV C

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE STD CHASSIS MODEL 180LF
FINISH WAVETEK PROCESS	RELEASE APPROV		
	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ±1° XX ± .030		
	DO NOT SCALE DWG		MODEL NO. 180LF / DWG NO. 1101-00-0050 / REV C
	SCALE		CODE IDENT 23338 / SHEET OF

REV	ECN	BY	DATE	APP
F	ECN 1571	RO	7-28-77	
181 ONLY				
C	ECN 1510	RO	2-7-77	
D	ECN 1406	RO	4-20-77	
B	ECN 1439	DHC	5-27-76	
NO CHANGE	SEE ECN 1478 FOR MODIFICATION	RO	9-14-76	
A	ECN 1415	RO	5-5-76	

+15V REGULATOR

-15V REGULATOR

HYSTERESIS SWITCH

TRI. ADJ.

TTL SYNC

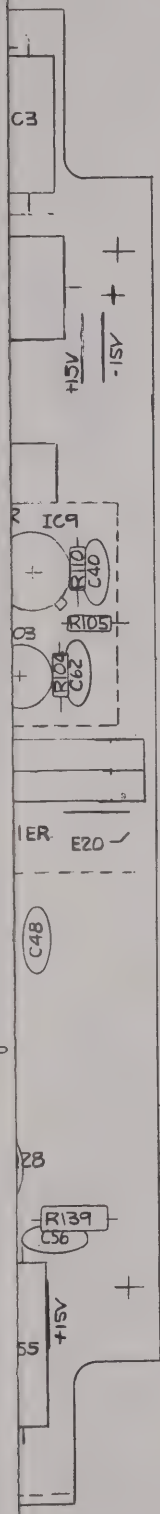
PULSE OUT (TTL)

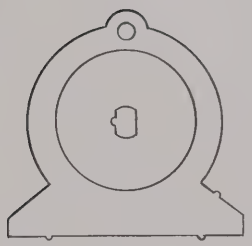
LAST DES. USED

IC10
Q30
CR26
R149
C62

CR19 NOT USED
R57

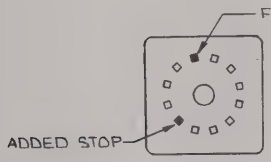
REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN BOCHICHIO	DATE 4-8-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE SCHEMATIC MAIN BOARD
FINISH WAVETEK PROCESS	RELEASE APPROV		
TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030	DO NOT SCALE DWG	SCALE	MODEL NO. 180, 181, 180LF
			DWG NO. 0105-00-0120 REV F
			CODE IDENT 23338 SHEET 1 OF 1

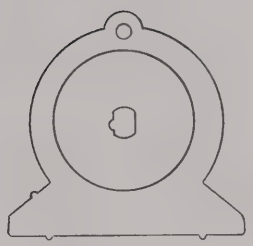




SW 1

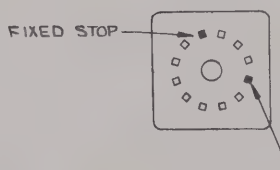
DETENT SHOWN FROM FRONT VIEW IN FULL COUNTER CLOCKWISE POSITION.





SW 2

DETENT SHOWN FROM FRONT VIEW IN FULL COUNTER CLOCKWISE POSITION.



NOTE: FOR SILKSCREEN MASTER DIGITIZE ALL BLACK NOMENCLATURE AND OUTLINES WITHIN BOARD OUTLINE

C	ECN 1571	R0	7-77
B	ECN 1521	R0	2-18-77
NOTE CHANGE	ADD ECN 1478 FOR TEMPORARY MODIFICATION		10-19-76
A	ECN 1915 R0	5-5-76	5-14-76

DRAWN BA	DATE 5-7-75	WAVETEK	
PROJENGR T.O.	5-14-76	TITLE	SILKSCREEN ASSEMBLY PRINT MAIN BOARD
RELEASE APPROV	5-14-76		
TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX±.010 ANGLES±1° .XY ±.030			
DO NOT SCALE DWG		MODEL NO. 180 181 180LF	DWG NO. 0101-00-0120 REV C
SCALE 2/1		CODE IDENT 23338	SHEET 1 OF 2

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REV	ECN	BY	DATE	APP
F	ECN 1393	RO	10-26-77	
E	ECN 1571	RO	7-28-77	
D	ECN 1406	RO	4-20-77	
C	ECN 1510	RO	2-7-77	
B	ECN 1439	DHC	8-27-76	
	NO CHANGE FOR MODIFICATION	RO	11-4-76	
A	ECN 1915	RO	5-5-78	

SWEEP GENERATOR

+15V REGULATOR

-15V REGULATOR

HYSTERESIS SWITCH

SWEEP RATE

SWEEP WIDTH

SWEEP OUT

VCG IN

FREQ DIAL

FREQ ADJ

VCG BUFFER AMPLIFIER

PDS CURRENT SOURCE

NEG CURRENT SOURCE

GCV AMPLIFIER

CAP MULT SYM ADJ.

INTEGRATOR CAP. MULT.

SQUARE WAVE SHAPER

SUMMING AMPL

OUTPUT AMPLIFIER

AMPLITUDE

DC OFFSET

OUTPUT BAL. ADJ.

SINE CONVERTER

DIST. ADJ

TRI. ADJ.

TTL SYNC

PULSE OUT (TTL)

180 LF ONLY

181 ONLY

(80-181 ONLY)

* MATCHED SETS
DIODES ARE FDxxxxx
CAP ARE IN uFd.
RES ARE IN SL. 1 8W 1% MF
NOTE UNLESS OTHERWISE SPECIFIED

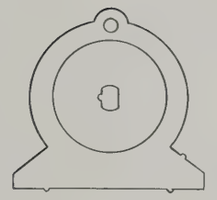
LAST DES USED
IC10
Q30
CR26
R149
C62
CR19 NOT USED
R57

REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS
DRAWN BOCHICCHIO DATE 4-8-75
PROJ ENGR
RELEASE APPROV
TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030
DO NOT SCALE DWG
SCALE

WAVETEK SAN DIEGO • CALIFORNIA

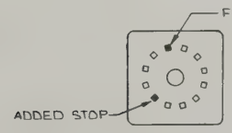
TITLE
SCHEMATIC
MAIN BOARD

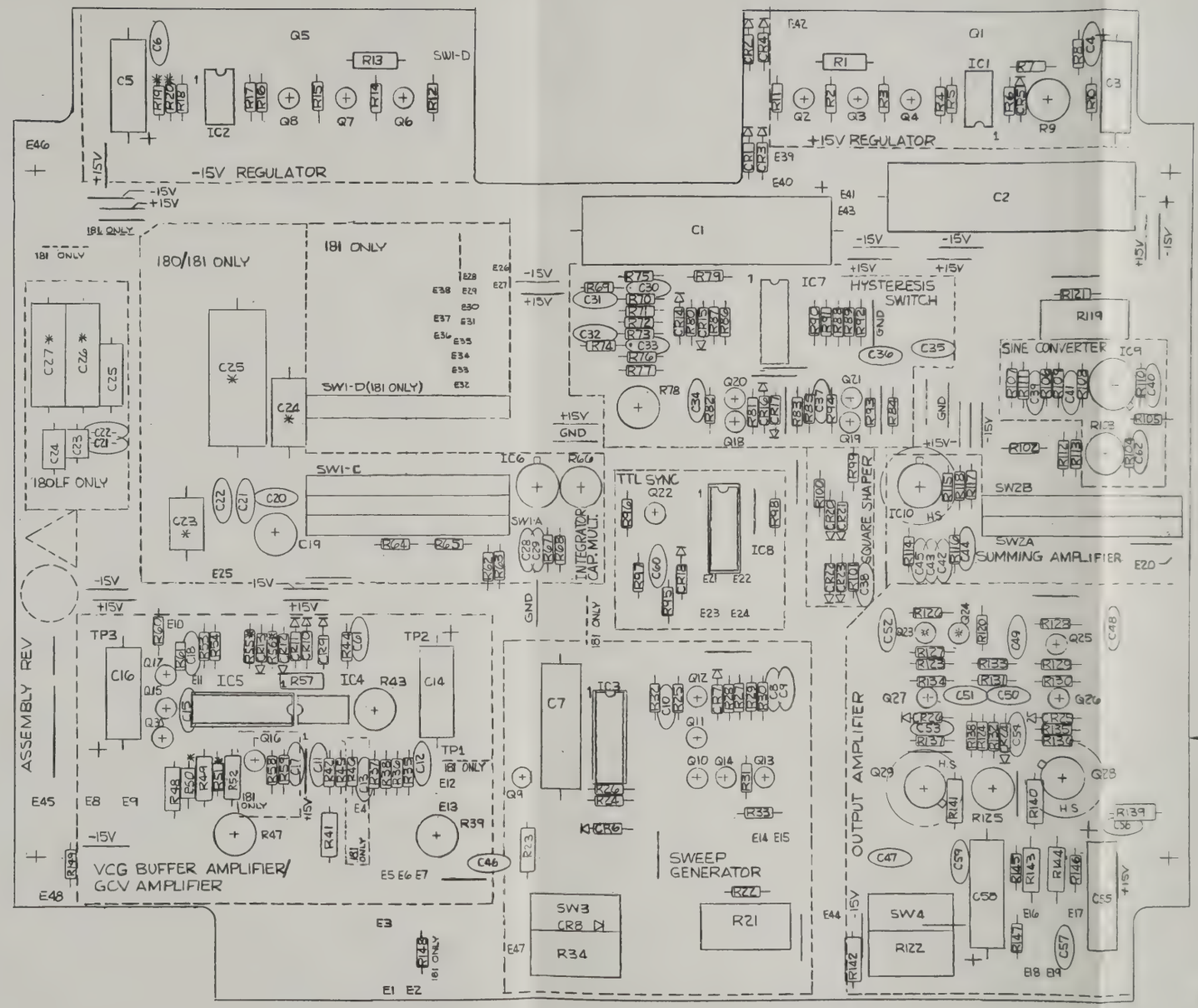
MODEL NO 180, 181, 180LF
DWG NO 0105-00-0120 REV F
CODE IDENT 23338
SHEET 1 OF 1

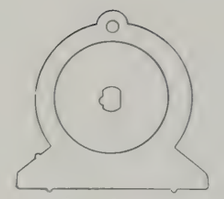


SW 1

DETENT SHOWN FROM FRONT VIEW IN FULL COUNTER CLOCKWISE POSITION.

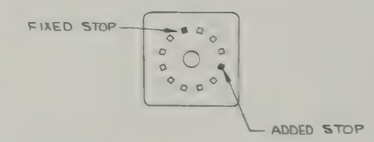






SW 2

DETENT SHOWN FROM FRONT VIEW IN FULL COUNTER CLOCKWISE POSITION.



NOTE: FOR SILKSCREEN MASTER DIGITIZE ALL BLACK NOMENCLATURE AND OUTLINES WITHIN BOARD OUTLINE

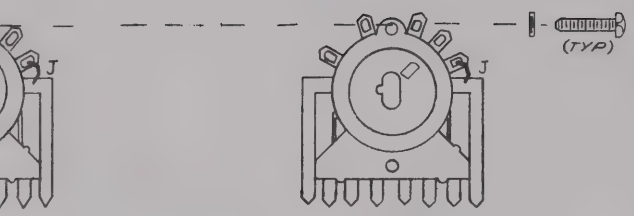
C	ECN 1571	R0	7-77
B	ECN 1521	R0	2-18-77
A	ECN 1415	R0	10-19-76

DRAWN BA	DATE 5-7-76	WAVETEK	
PROTENGR T.O	5-14-76	TITLE	SILKSCREEN ASSEMBLY PRINT MAIN BOARD
RELEASE APPROV	5-14-76		
TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ± .010 ANGLES ± 1° .XX ± .030			
DO NOT SCALE DWG		MODEL NO. 180 181 180LF	DWG NO. 0101-00-0120 REV C
SCALE 2/1		CODE IDENT 23338	SHEET 1 OF 2

REV	ECN	BY	DATE	APP

"SW-1" - HARDWARE

⚠	ADJ. SW. STOP	1
	3/8" F.P. WASHER	1
	3/8" F.P. NUT	1
	1497 SOLDER LUG	1
	#4 MIN LCKWSHR	2
	4/40 X 3/4" PN.HD.SCR.	2



SW1-D
MODEL 181 ONLY

"SW-2" - HARDWARE

ADJ. SW. STOP	1
3/8" PANEL NUT	1
3/8" PANEL WASHER	1
1497 SOLDER LUG	1
#4 MIN LOCKWASHER	2
4/40 X 1/2" PN. HD SCREW.	2

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN RO FIFER	DATE 5/21/74	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL /	PROJ ENGR T. O.	6/14/74	TITLE SWITCH ASSEMBLY MAIN BOARD
FINISH WAVETEK PROCESS /	RELEASE & APPROV W. Fish		
	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG	MODEL NO. 180, 180LF, 181	DWG NO. 0101-00-0120 REV C
	SCALE /	CODE IDENT 23338	SHEET 2 OF 2

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REV	ECN	BY	DATE	APP

REFER		MFGR	WAVETEK NO.	QTY/PT
NONE		TB	2800-00-0021	2
NONE		USECO	2800-09-0021	2
NONE		WAKE	2800-11-0001	3
C38 C		METRS	2800-11-0004	2
C10		WVTK	4600-01-0207	1
C15 C		BECK	4600-01-0209	2
C11 C		CTS	4600-01-0302	1
C34 C		BECK	4600-01-0315	1
C51 C		BECK	4600-01-0402	2
C9		BECK	4600-02-0101	1
C35 C		BECK	4600-02-0201	2
C48 C		CTS	4602-01-0300	2
C49		STKPL	4700-25-0100	4
C40 C		STKPL	4700-25-0399	1
C41 C		STKPL	4700-25-0430	2
C62		STKPL	4700-25-1004	5
C30T		STKPL	4700-25-2200	1
C31 C		STKPL	4700-25-4703	1
C20T				
C21T				

Y NO. 0-0120 REV F

3

DEMCO BUSINESS FORMS PRINTING, INC. 2187

REFER		MFGR	WAVETEK NO.	QTY/PT
C22		TRW	4701-03-1000	4
C14		TRW	4701-03-1001	10
C1 C		TRW	4701-03-1002	5
C55		TRW	4701-03-1003	3
C7		TRW	4701-03-1052	1
C19		TRW	4701-03-1211	3
		TRW	4701-03-1212	5
		TRW	4701-03-1302	1
C23		TRW	4701-03-1500	1
		TRW	4701-03-1501	7
C24		TRW	4701-03-1502	2
		TRW	4701-03-1650	2
C25		TRW	4701-03-1781	2
		TRW	4701-03-2001	3
2		TRW	4701-03-2152	1
132		TRW	4701-03-2159	4
133		TRW	4701-03-2211	1
138				

Y NO. 0-0120 REV F

4

DEMCO BUSINESS FORMS PRINTING, INC. 2187

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE
MATERIAL	PROJ ENGR	
	RELEASE APPROV	
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030	
	DO NOT SCALE DWG	
	SCALE	

WAVETEK SAN DIEGO + CALIFORNIA

TITLE: MAIN BD

MODEL NO.	DWG NO.	REV
180	1100-00-0120	F

CODE IDENT 23338 SHEET 1 OF 2

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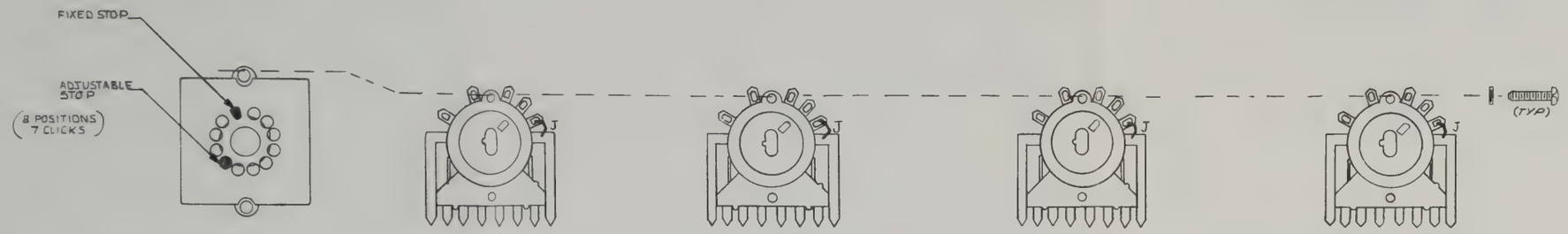
REV	ECN	BY	DATE	APP



SW1
DETENT 5104-99-0025
SHOWN FROM FRONT
IN FULL CCW POSITION

SW1-A
WAFER (TYPICAL)
5104-02-0015 (147-400)

SW1-B

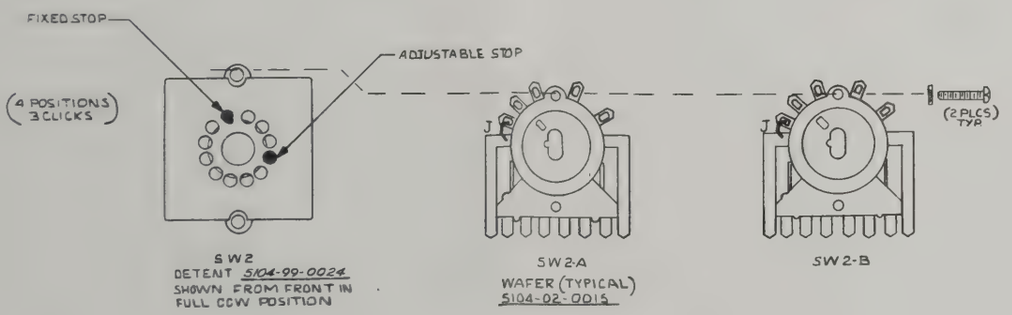
SW1-C

SW1-D
MODEL 181 ONLY

MODELS 180 & 180LF USE 3 WAFERS
MODEL 181 USES 4 WAFERS

"SW-1" - HARDWARE

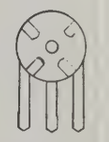
⚠ ADJ. SW. STOP	1
3/8" F.P. WASHER	1
3/8" F.P. NUT	1
1497 SOLDER LUG	1
#4 MIN LCKWSHR	2
4/40 X 3/4" PN. HD. SCR.	2



SW2
DETENT 5104-99-0024
SHOWN FROM FRONT IN
FULL CCW POSITION

SW2-A
WAFER (TYPICAL)
5104-02-0015

SW2-B



P.C. POT.
41600-01-0207
(W/SHAFT)

"SW-2" - HARDWARE

ADJ. SW. STOP	1
3/8" PANEL NUT	1
3/8" PANEL WASHER	1
1497 SOLDER LUG	1
#4 MIN LOCKWASHER	2
4/40 X 1/2" PN. HD SCREW.	2

⚠ USE ADJUSTABLE SWITCH STOP " 5104-00-0003

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN RO FIFER	DATE 5/2/78	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL /	PROJENGR T. O.	6/14/78	TITLE SWITCH ASSEMBLY MAIN BOARD
FINISH WAVETEK PROCESS /	RELEASED L. Fish		
	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1° XX ±.030		
	DO NOT SCALE DWG	MODEL NO 180, 180LF, 181	DWG NO 0101-00-0120 REV C
	SCALE /	CODE IDENT 23338	SHEET 2 OF 2

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND DESIGN RIGHTS BELONGING TO WAVETEK AND MAY NOT BE REPRODUCED FOR ANY REASON EXCEPT CALIBRATION, OPERATION, AND MAINTENANCE WITHOUT WRITTEN AUTHORIZATION.

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	ASSY,DRWG MAIN	0101-00-0120	WVTK	0101-00-0120	1
NONE	SCHEMATIC,MAIN	0103-00-0120	WVTK	0103-00-0120	1
NONE	QA PROC,MAIN	0107-00-0120	WVTK	0107-00-0120	1
C38 C44	CAP,CER,10PF,1KV	DD-100	CRL	1500-01-0011	2
C10	CAP,CER,100PF,1KV	DD-101	CRL	1500-01-0111	1
C15 C61	CAP,CER,.001MF,1KV	DD-102	CRL	1500-01-0211	2
C11 C12 C18 C28 C29 C34 C37 C4 C47 C50 C51 C56 C59 C6 C60 C8 C9	CAP,CER,.01MF,50V	CK-103	CRL	1500-01-0310	17
C35 C36 C42 C43 C45 C48 C52 C53 C54	CAP,CER,.1MF,20V	UK20-104	ARCO	1500-01-0413	9
C49	CAP,CER,15PF,1KV	DD-150	CRL	1500-01-5011	1
C40 C57	CAP,CER,220PF,1KV	DD-221	CRL	1500-02-2111	2
C41 C46	CAP,CER,330PF,1KV	DD-331	CRL	1500-03-3111	2
C62	CAP,CER,82PF,1KV	DD-820	CRL	1500-08-2011	1
C30T C33T	CAP,MICA,100PF,500V	DM15-101J	ARCO	1500-11-0100	2
C31 C32	CAP,MICA,330PF,500V	DM15-331J	ARCO	1500-13-3100	2
C20T	CAP,MICA,68PF,500V	DM15-680J	ARCO	1500-16-8000	1
C21T	CAP,MICA,82PF,500V	DM15-820J	ARCO	1500-16-2000	1

WAVETEK PARTS LIST | TITLE MAIN | ASSEMBLY NO. 1100-00-0120 | PAGE: 1 | REV F

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
C22	CAP,MICA,910PF,500V	DM15-911F	ARCO	1500-19-1101	1
C14 C16 C3 C5	CAP,ELECT,100MF,16V	S00D107G016DC7	SPRAG	1500-31-0101	4
C1 C2	CAP,ELECT,1000MF,35V	39D108G035GL6	SPRAG	1500-31-0212	2
C55 C58	CAP,ELECT,50MF,50V	S00D506G050DD7	SPRAG	1500-35-0003	2
C7	CAP,MYLR,.33MF,100V	WMF1P33	COL	1500-43-3400	1
C19	VARI,3.5-13PF,250V	7S-TRIKO-02 3.5/13PF	TRIKO	1500-51-3000	1
	CAP,SET,POLYC CONSIST:1509-90-0005 THRU:0007	180-S01-101	WVTK	1509-80-0008	1
C23	CAP,POLYC,.01MF,100V PART OF 1509-80-0008 QTY:01:1500-41-0304				
C24	CAP,POLYC,.1MF,100V PART OF 1509-80-0008 QTY:01:1500-41-0404				
C25	CAP,POLYC,1MF,100V PART OF 1509-80-0008 QTY:01:1500-41-0504				
2	MAIN	180-110	WVTK	1700-00-0120	1
132	SKT,IC,14PIN	14-DIP	CINCH	2100-03-0011	2
133	SKT,IC,16PIN	16-DIP	CINCH	2100-03-0022	1
138	SOLDER LUG	1497	SMITH	2100-04-0012	2

WAVETEK PARTS LIST | TITLE MAIN | ASSEMBLY NO. 1100-00-0120 | PAGE: 2 | REV F

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	TIE,FLAG	TY-51M	TB	2800-00-0021	2
NONE	FAST,CHASSIS	1591-H11	USECO	2800-09-0021	2
131	HEAT SINK	NF-207	WAKE	2800-11-0001	3
130	TRANSIPAD	10160	METRS	2800-11-0004	2
R119	POT,CONT,1K	180-401	WVTK	4600-01-0207	1
R66 R9	POT,TRIM,1K	91AR1K	BECK	4600-01-0209	2
R21	POT,CONT,10K	JK-1303	CTS	4600-01-0302	1
R43	POT,TRIM,10K	91AR10K	BECK	4600-01-0315	1
R125 R47	POT,TRIM,100K	91AR100K	BECK	4600-01-0402	2
R103	POT,TRIM,200	91AR200	BECK	4600-02-0101	1
R39 R78	POT,TRIM,2K	91AR2K	BECK	4600-02-0201	2
R122 R34	POT,SWITCH,10K	GH-1879	CTS	4602-01-0300	2
R1 R13 R140 R141	RES,C,1/2W,5%,10	RC20GF-100	STKPL	4700-25-0100	4
R41T	RES,C,1/2W,5%,3.9	RC20GF-3R9	STKPL	4700-25-0399	1
R139 R142	RES,C,1/2W,5%,43	RC20GF-430	STKPL	4700-25-0430	2
R48 R49 R52	RES,C,1/2W,5%,1M	RC20GF-105	STKPL	4700-25-1004	3
R149	RES,C,1/2W,5%,220	RC20GF-221	STKPL	4700-25-2200	1
R23	RES,C,1/2W,10%,470K	RC20GF-474	STKPL	4700-25-4703	1

WAVETEK PARTS LIST | TITLE MAIN | ASSEMBLY NO. 1100-00-0120 | PAGE: 3 | REV F

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R135 R67 R82 R94	RES,MF,1/8W,1%,100	RN55D-1000F	TRW	4701-03-1000	4
R114 R117 R16 R17 R4 R5 R71 R72 R86 R91	RES,MF,1/8W,1%,1K	RN55D-1001F	TRW	4701-03-1001	10
R24 R26 R31 R88 R96	RES,MF,1/8W,1%,10K	RN55D-1002F	TRW	4701-03-1002	5
R124 R27 R30	RES,MF,1/8W,1%,100K	RN55D-1003F	TRW	4701-03-1003	3
R28	RES,MF,1/8W,1%,10.5K	RN55D-1052F	TRW	4701-03-1052	1
R115 R116 R95	RES,MF,1/8W,1%,1.21K	RN55D-1211F	TRW	4701-03-1211	3
R112 R70 R73 R75 R77	RES,MF,1/8W,1%,12.1K	RN55D-1212F	TRW	4701-03-1212	5
R25	RES,MF,1/8W,1%,13K	RN55D-1302F	TRW	4701-03-1302	1
R137	RES,MF,1/8W,1%,150	RN55D-1500F	TRW	4701-03-1500	1
R102 R113 R118 R60 R81 R84 R93	RES,MF,1/8W,1%,1.5K	RN55D-1501F	TRW	4701-03-1501	7
R38 R62	RES,MF,1/8W,1%,15K	RN55D-1502F	TRW	4701-03-1502	2
R108 R109	RES,MF,1/8W,1%,165	RN55D-1650F	TRW	4701-03-1650	2
R101 R89	RES,MF,1/8W,1%,1.78K	RN55D-1781F	TRW	4701-03-1781	2
R130 R134 R36	RES,MF,1/8W,1%,2K	RN55D-2001F	TRW	4701-03-2001	3
R29	RES,MF,1/8W,1%,21.5K	RN55D-2152F	TRW	4701-03-2152	1
R121 R136 R138 R146	RES,MF,1/8W,1%,215	RN55D-2150F	TRW	4701-03-2150	4
R96	RES,MF,1/8W,1%,2.21K	RN55D-2211F	TRW	4701-03-2211	1

WAVETEK PARTS LIST | TITLE MAIN | ASSEMBLY NO. 1100-00-0120 | PAGE: 4 | REV F

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: MAIN BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° XX ±.030		
	DO NOT SCALE DWG	MODEL NO 180	DWG NO. 1100-00-0120 REV F
	SCALE	CODE IDENT 23338	SHEET 1 OF 2

REV	ECN	BY	DATE	APP

ERENCE DESIGNATORS	PART DESCRIPTION	UNIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	TRANS	2N2219A	FAIR	4901-02-2191	1
	TRANS	2N2905A	FAIR	4901-02-4051	1
Q7 Q8	TRANS	2N3638A	FAIR	4901-03-6381	5
Q22 Q3 Q4	TRANS	2N3642	FAIR	4901-03-6420	4
Q30	TRANS	2N3903	FAIR	4901-03-9030	2
Q17 Q26	TRANS	2N3905	FAIR	4901-03-9050	3
Q11 Q12 Q15 Q18 Q19 Q20 Q21 Q25	TRANS	2N5139	FAIR	4901-05-1390	11
	TRANS	TIP-29	TI	4902-00-0290	1
	TRANS	TIP-30	TI	4902-00-0300	1
Q24	TRANS,M/PR/2N3903 QTY:2:4901-03-9030	182-503-102	WVTK	4998-00-0015	1
E	WAFER	147-400	WVTK	5104-02-0015	5
	DETENT MOD FROM:5104-01-0009	180-313	WVTK	5104-99-0024	1
	DETENT MOD FROM:5104-01-0009	180-314	WVTK	5104-99-0025	1
	IC	7000-03-1000	WVTK	7000-03-1000	1
0	IC	LM318M	NSC	7000-03-1800	1

WAVETEK PARTS LIST	TITLE MAIN	ASSEMBLY NO. 1100-00-0120 PAGE: 7	REV F

ERENCE DESIGNATORS	PART DESCRIPTION	UNIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
IC2 IC4	IC	MA-741	FAIR	7000-07-4100	5
	IC	CA-3019	RCA	7000-30-1900	1
	IC	CA-3054	RCA	7000-30-5400	1
	IC	CA-3096AE	RCA	7000-30-9600	1
	IC	LM3900	NSC	7000-34-0000	1
	IC	7400	TI	8000-74-0000	1

WAVETEK PARTS LIST	TITLE MAIN	ASSEMBLY NO. 1100-00-0120 PAGE: 8	REV F

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE MAIN BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1° .XX ±.030		MODEL NO. 180 DWG NO. 1100-00-0120 REV 2
	DO NOT SCALE DWG		CODE IDENT 23338 SHEET 2 OF 2
	SCALE		

REV	ECN	BY	DATE	APP

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REFERENCE NO	MFGR	WAVETEK NO.	QTY/PT
NONE	USECO	2800-09-0021	2
NONE	WAKE	2800-11-0001	3
NONE	METRS	2800-11-0004	2
C38T	WVTK	4600-01-0207	1
C10	BECK	4600-01-0209	2
C15	CTS	4600-01-0302	1
C11 C34 C51 C9	BECK	4600-01-0315	1
	BECK	4600-01-0402	2
	BECK	4600-02-0101	1
C35 C48	BECK	4600-02-0201	2
C49	CTS	4602-01-0300	2
C40	STKPL	4700-25-0100	4
C41	STKPL	4700-25-0399	1
C62	STKPL	4700-25-0430	2
C30T	STKPL	4700-25-1004	3
C31	STKPL	4700-25-2200	1
C21T	STKPL	4700-25-4703	1
C22	TRW	4701-03-1000	4

ASSEMBLY NO. 1100-00-0121 REV G
PAGE 3

REFERENCE NO	MFGR	WAVETEK NO.	QTY/PT
C14	TRW	4701-03-1001	10
C1 C4			
C55	TRW	4701-03-1002	5
C7	TRW	4701-03-1003	3
	TRW	4701-03-1052	1
	TRW	4701-03-1211	3
C23	TRW	4701-03-1212	5
	TRW	4701-03-1302	1
C24	TRW	4701-03-1500	1
	TRW	4701-03-1501	7
C25	TRW	4701-03-1502	2
	TRW	4701-03-1650	2
C26	TRW	4701-03-1781	2
	TRW	4701-03-2001	3
2	TRW	4701-03-2152	1
142	TRW	4701-03-2159	4
10	TRW	4701-03-2211	1
NONE	TRW	4701-03-2213	1

ASSEMBLY NO. 1100-00-0121 REV G
PAGE 4

DEMCO BUSINESS FORMS PRINTING, INC. 2197

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE
MATERIAL	PROJ ENGR	
	RELEASE APPROV	
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030	
	DO NOT SCALE DWG	
	SCALE	

WAVETEK SAN DIEGO • CALIFORNIA

TITLE: MAIN BD

MODEL NO.	DWG NO.	REV
180LF	1100-00-0121	G

CODE IDENT 23338 SHEET 1 OF 2

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	UNIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R37	RES,MF,1/8W,1%,2211	RN55D-2211F	TRW	4701-03-2211	1
R76T	RES,MF,1/8W,1%,2371	RN55D-2371F	TRW	4701-03-2371	1
R105 R124	RES,MF,1/8W,1%,249	RN55D-2490F	TRW	4701-03-2490	2
R87 R90	RES,MF,1/8W,1%,2.49K	RN55D-2491F	TRW	4701-03-2491	2
R131 R44 R55	RES,MF,1/8W,1%,24.9K	RN55D-2492F	TRW	4701-03-2492	3
R42 R83 R85	RES,MF,1/8W,1%,3.01K	RN55D-3011F	TRW	4701-03-3011	3
R106 R110	RES,MF,1/8W,1%,30.1K	RN55D-3012F	TRW	4701-03-3012	2
R7	RES,MF,1/8W,1%,3.32K	RN55D-3321F	TRW	4701-03-3321	1
R107 R111	RES,MF,1/8W,1%,33.2K	RN55D-3322F	TRW	4701-03-3322	2
R79 R80	RES,MF,1/8W,1%,33.2	RN55D-33R2F	TRW	4701-03-3329	2
R127	RES,MF,1/8W,1%,3.65K	RN55D-3651F	TRW	4701-03-3651	1
R6	RES,MF,1/8W,1%,3.92K	RN55D-3921F	TRW	4701-03-3921	1
R69T R76T	RES,MF,1/8W,1%,4KQ	RN55D-4640F	TRW	4701-03-4640	2
R11 R12 R18	RES,MF,1/8W,1%,4.75K	RN55D-4751F	TRW	4701-03-4751	3
R104 R120 R126 R133 R14 R145 R2 R92	RES,MF,1/8,1%,499	RN55D-4990F	TRW	4701-03-4990	8
R128 R132 R15 R3 R35 R45 R54 R64 R66	RES,MF,1/8W,1%,4.99K	RN55D-4991F	TRW	4701-03-4991	9
R32 R65	RES,MF,1/8W,1%,49.9K	RN55D-4992F	TRW	4701-03-4992	2

WAVETEK PARTS LIST	TITLE MAIN	ASSEMBLY NO. 1100-00-0120 PAGE: 5	REV F

REFERENCE DESIGNATORS	PART DESCRIPTION	UNIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
Q28	TRANS	2N2219A	FAIR	4901-02-2191	1
Q29	TRANS	2N2905A	FAIR	4901-02-9051	1
Q6 Q7 Q8	TRANS	2N3638A	FAIR	4901-03-8381	3
Q2 Q22 Q3 Q4	TRANS	2N3640	FAIR	4901-03-8020	4
Q27 Q30	TRANS	2N3903	FAIR	4901-03-9030	2
Q15 Q17 Q26	TRANS	2N3905	FAIR	4901-03-9050	3
Q10 Q11 Q12 Q13 Q14 Q16 Q19 Q20 Q21 Q25 Q9	TRANS	2N5134	FAIR	4901-05-1390	11
Q5	TRANS	TIP-29	TI	4902-00-0290	1
Q1	TRANS	TIP-30	TI	4902-00-0300	1
Q23 Q24	TRANS,K/PR/2N3903 QTY:2[4901-03-9030	182-503-102	WVTK	4998-00-0015	1
NONE	WAFER	147-400	WVTK	5104-02-0015	5
SW2	DETENT MOD FROM:5104-01-0004	180-313	WVTK	5104-44-0024	1
SW1	DETENT MOD FROM:5104-01-0009	180-314	WVTK	5104-44-0025	1
IC6	IC	7000-03-1000	WVTK	7000-03-1000	1
IC10	IC	LM319M	NSC	7000-03-1800	1

WAVETEK PARTS LIST	TITLE MAIN	ASSEMBLY NO. 1100-00-0120 PAGE: 7	REV F

REFERENCE DESIGNATORS	PART DESCRIPTION	UNIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R147	RES,MF,1/8W,1%,54.9	RN55D-54R9F	TRW	4701-03-5499	1
R63	RES,MF,1/8W,1%,576	RN55D-5760F	TRW	4701-03-5760	1
R33 R61	RES,MF,1/8W,1%,604	RN55D-6040F	TRW	4701-03-6040	2
R10	RES,MF,1/8W,1%,6.19K	RN55D-6191F	TRW	4701-03-6191	1
R123 R97	RES,MF,1/8W,1%,6.81K	RN55D-6811F	TRW	4701-03-6811	2
R100 R99	RES,MF,1/8W,1%,7.87K	RN55D-7871F	TRW	4701-03-7871	2
R22	RES,MF,1/8W,1%,78.7	RN55D-78R7F	TRW	4701-03-7879	1
R8	RES,MF,1/8W,1%,8.25K	RN55D-8251F	TRW	4701-03-8251	1
R143 R144	RES,MF,1/8W,1%,100	RN55D-1000F	TRW	4701-23-1000	2
R19 R20	RES,SEL,4-10K,1/8W QTY:2[4701-03-1002	142-501-644	WVTK	4784-00-0019	1
R50 R51 R55 R56	RES,SET,499,99K,1/8W QTY:4[4701-03-4991	180-500-100A	WVTK	4789-00-0039	1
CR24 CR5 CR9	DIODE	1N4581	MICRO	4801-01-4581	3
CR1 CR2 CR3 CR4	DIODE	SCE-1	SEMTC	4801-02-0001	4
CR10 CR11 CR12 CR13	DIODE	FD-777	FAIR	4807-02-0777	4
CR14 CR15 CR16 CR17 CR18 CR20 CR21 CR22 CR23 CR25 CR26 CR8 CR7 CR8	DIODE	FD-6666	FAIR	4807-02-6666	14

WAVETEK PARTS LIST	TITLE MAIN	ASSEMBLY NO. 1100-00-0120 PAGE: 8	REV F

REFERENCE DESIGNATORS	PART DESCRIPTION	UNIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
IC1 IC2 IC4	IC	MA-741	FAIR	7000-07-4100	3
IC4	IC	CA-3019	RCA	7000-30-1900	1
IC7	IC	CA-3054	RCA	7000-30-5400	1
IC5	IC	CA-3096AE	RCA	7000-30-9A00	1
IC3	IC	LM3900	NSC	7000-39-0000	1
IC8	IC	7400	TI	8000-74-0000	1

WAVETEK PARTS LIST	TITLE MAIN	ASSEMBLY NO. 1100-00-0120 PAGE: 9	REV F

NOTE UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJENGR		TITLE: MAIN BD
FINISH WAVETEK PROCESS	RELEASE APPROV		
	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 XX ±.030		MODEL NO: 180
	DO NOT SCALE DWG		DWG NO: 1100-00-[illegible]3
	SCALE		REV: C
			CODE IDENT: 23338
			SHEET 2 OF 2

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND DESIGN RIGHTS BELONGING TO WAVETEK AND MAY NOT BE REPRODUCED FOR ANY REASON EXCEPT CALIBRATION, OPERATION, AND MAINTENANCE WITHOUT WRITTEN AUTHORIZATION.

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	ASSY,UNMG MAIN	0101-00-0120	WVTK	0101-00-0120	1
NONE	SCHEMATIC,MAIN	0103-00-0120	WVTK	0103-00-0120	1
NONE	QA PROC,MAIN	0107-00-0120	WVTK	0107-00-0120	1
C38T C44T	CAP,CER,10PF,1KV	DD-100	CRL	1500-01-0011	2
C10	CAP,CER,100PF,1KV	DD-101	CRL	1500-01-0111	1
C15 C61	CAP,CER,.001MF,1KV	DD-102	CRL	1500-01-0211	2
C11 C12 C18 C28 C29 C34 C37 C4 C47 C50 C51 C56 C59 C6 C60 C8 C9	CAP,CER,.01MF,50V	CK-103	CRL	1500-01-0310	17
C35 C36 C42 C43 C45 C48 C52 C53 C54	CAP,CER,.1MF,20V	UK20-104	AMCO	1500-01-0419	9
C49	CAP,CER,15PF,1KV	DD-150	CRL	1500-01-5011	1
C40 C57	CAP,CER,220PF,1KV	DD-221	CRL	1500-02-2111	2
C41 C46	CAP,CER,330PF,1KV	DD-331	CRL	1500-03-3111	2
C62	CAP,CER,82PF,1KV	DD-820	CRL	1500-08-2011	1
C30T C33T	CAP,MICA,100PF,500V	DM15-101J	AMCO	1500-11-0100	2
C31 C32	CAP,MICA,330PF,500V	DM15-331J	AMCO	1500-13-3100	2
C21T	CAP,MICA,82PF,500V	DM15-820J	AMCO	1500-18-2000	1
C22	CAP,MICA,910PF,500V	DM15-911F	AMCO	1500-19-1101	1

WAVETEK PARTS LIST | TITLE MAIN | ASSEMBLY NO. 1100-00-0121 | PAGE: 1 | REV G

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
C14 C16 C3 C5	CAP,ELECT,100MF,16V	500D107G016DC7	SPRAG	1500-31-0101	4
C1 C2	CAP,ELECT,1000MF,35V	39D108G035GL6	SPRAG	1500-31-0212	2
C55 C58	CAP,ELECT,50MF,50V	500D506G050DD7	SPRAG	1500-35-0003	2
C7	CAP,MYLAR,.33MF,100V	RMF1P33	CDE	1500-43-3404	1
	CAP,SET,POLYC CONSIST:1504-40-0001 THRU:0004	130-501-6	WVTK	1509-80-0005	1
C23	CAP,POLYC,.01MF,100V PART OF 1509-80-0005 QTY:01:1500-41-0504				
C24	CAP,POLYC,.1MF,100V PART OF 1509-80-0005 QTY:01:1500-41-0404				
C25	CAP,POLYC,1MF,100V PART OF 1509-80-0005 QTY:01:1500-41-0504				
C26 C27	CAP,POLYC,5MF,100V PART OF 1509-80-0005 QTY:02:1500-43-0504				
J	MAIN	180-110	WVTK	1700-00-0120	1
U42	SKT,IC,14PIN	14-DIP	CINCH	2100-03-0011	2
U9	SKT,IC,16PIN	16-DIP	CINCH	2100-03-0022	1
NONE	SOLDER LUG	1497	SMITH	2100-04-0012	2

WAVETEK PARTS LIST | TITLE MAIN | ASSEMBLY NO. 1100-00-0121 | PAGE: 2 | REV G

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	FAST,CHASSIS	1591-B11	USECO	2800-09-0021	2
U31	HEAT SINK	HF-207	AAKE	2800-11-0001	3
NONE	TRANSIPAD	10160	METWS	2800-11-0004	2
R119	POT,CONT,1K	180-401	WVTK	4600-01-0207	1
R66 R9	POT,TRIM,1K	91AM1K	BECK	4600-01-0209	2
R21	POT,CONT,10K	JA-1303	CTS	4600-01-0302	1
R43	POT,TRIM,10K	91AM10K	BECK	4600-01-0315	1
R125 R47	POT,TRIM,100K	91AM100K	BECK	4600-01-0402	2
R103	POT,TRIM,200	91AM200	BECK	4600-02-0101	1
R39 R78	POT,TRIM,2K	91AM2K	BECK	4600-02-0201	2
R122 R34	POT,SWITCH,10K	GM-1879	CTS	4602-01-0300	2
R1 R15 R140 R141	RES,C,1/2W,5%,10	RC20GF-100	STKPL	4700-25-0100	4
R41T	RES,C,1/2W,5%,3.9	RC20GF-3R9	STKPL	4700-25-0399	1
R139 R142	RES,C,1/2W,5%,43	RC20GF-430	STKPL	4700-25-0430	2
R48 R49 R52	RES,C,1/2W,5%,1M	RC20GF-105	STKPL	4700-25-1004	3
R149	RES,C,1/2W,5%,220	RC20GF-221	STKPL	4700-25-2200	1
R23	RES,C,1/2W,10%,470K	RC20GF-474	STKPL	4700-25-4703	1
R135 R67 R82 R94	RES,MF,1/8W,1%,100	RN55D-1000F	TRW	4701-03-1000	4

WAVETEK PARTS LIST | TITLE MAIN | ASSEMBLY NO. 1100-00-0121 | PAGE: 3 | REV G

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R114 R117 R16 R17 R4 R5 R71 R72 R86 R91	RES,MF,1/8W,1%,1K	RN55D-1001F	TRW	4701-03-1001	10
R24 R26 R31 R88 R96	RES,MF,1/8W,1%,10K	RN55D-1002F	TRW	4701-03-1002	5
R124 R27 R30	RES,MF,1/8W,1%,100K	RN55D-1003F	TRW	4701-03-1003	3
R28	RES,MF,1/8W,1%,10.5K	RN55D-1052F	TRW	4701-03-1052	1
R115 R116 R95	RES,MF,1/8W,1%,1.21K	RN55D-1211F	TRW	4701-03-1211	3
R112 R70 R73 R75 R77	RES,MF,1/8W,1%,12.1K	RN55D-1212F	TRW	4701-03-1212	5
R25	RES,MF,1/8W,1%,13K	RN55D-1302F	TRW	4701-03-1302	1
R137	RES,MF,1/8W,1%,150	RN55D-1500F	TRW	4701-03-1500	1
R102 R113 R118 R60 R81 R84 R93	RES,MF,1/8W,1%,1.5K	RN55D-1501F	TRW	4701-03-1501	7
R38 R62	RES,MF,1/8W,1%,15K	RN55D-1502F	TRW	4701-03-1502	2
R108 R109	RES,MF,1/8W,1%,165	RN55D-1650F	TRW	4701-03-1650	2
R101 R89	RES,MF,1/8W,1%,1.78K	RN55D-1781F	TRW	4701-03-1781	2
R130 R134 R36	RES,MF,1/8W,1%,2K	RN55D-2001F	TRW	4701-03-2001	3
R29	RES,MF,1/8W,1%,21.5K	RN55D-2152F	TRW	4701-03-2152	1
R121 R135 R138 R146	RES,MF,1/8W,1%,21.5	RN55D-21R5F	TRW	4701-03-2159	4
R98	RES,MF,1/8W,1%,2.21K	RN55D-2211F	TRW	4701-03-2211	1
R37	RES,MF,1/8W,1%,221K	RN55D-2213F	TRW	4701-03-2213	1

WAVETEK PARTS LIST | TITLE MAIN | ASSEMBLY NO 1100-00-0121 | PAGE: 4 | REV G

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: MAIN BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1° XX ±.030		MODEL NO: 180LF; DWG NO: 1100-00-0121; REV: G
	DO NOT SCALE DWG		CODE IDENT: 23338; SHEET 1 OF 2
	SCALE		

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
Q29	TRANS	2N2905A	FAIR	4901-02-4051	1
Q6 Q7 Q8	TRANS	2N3638A	FAIR	4901-03-6381	3
Q2 Q22 Q3 Q4	TRANS	2N3640	FAIR	4901-03-6420	4
Q27 Q30	TRANS	2N3905	FAIR	4901-03-9030	2
Q15 Q17 Q26	TRANS	2N3905	FAIR	4901-03-9050	3
Q10 Q11 Q12 Q13 Q14 Q18 Q19 Q20 Q21 Q25 Q9	TRANS	2N5139	FAIR	4901-05-1390	11
Q5	TRANS	TIP-29	TI	4902-00-0290	1
Q1	TRANS	TIP-30	TI	4902-00-0300	1
Q23 Q24	TRANS,M/P#2N3905 QTY:2:4901-03-9030	182-503-102	WVTK	4998-00-0015	1
135	WAFER	147-400	WVTK	5104-02-0015	2
NONE	DETENT MOD FROM:5104-01-0009	180-313	WVTK	5104-99-0024	1
NONE	DETENT MOD FROM:5104-01-0009	180-314	WVTK	5104-99-0025	1
IC6	IC	7000-03-1000	WVTK	7000-03-1000	1
IC10	IC	LM318H	NSC	7000-03-1800	1
IC1 IC2 IC4	IC	MC1741	FAIR	7000-07-4100	3

WAVETEK PARTS LIST	TITLE MAIN	ASSEMBLY NO. 1100-00-0121 PAGE: 7	REV G

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
IC9	IC	CA-3019	RCA	7000-30-1900	1
IC7	IC	CA-3054	RCA	7000-30-5400	1
IC5	IC	CA-3096AE	RCA	7000-30-9600	1
IC3	IC	LM3900	NSC	7000-39-0000	1
IC8	IC	7400	TI	6000-74-0000	1

WAVETEK PARTS LIST	TITLE MAIN	ASSEMBLY NO. 1100-00-0121 PAGE: 8	REV G

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE MAIN BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG		MODEL NO. 180LF / DWG NO. 1100-00-0121 / REV G
	SCALE		CODE IDENT 23338 / SHEET 2 OF 2

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REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R70T	RES,MF,1/8W,1%,237K	MK55C-2373F	TRW	4701-03-2373	1
R105 R129	RES,MF,1/8W,1%,249	MK55C-2490F	TRW	4701-03-2490	2
R87 R90	RES,MF,1/8W,1%,2.49K	MK55C-2491F	TRW	4701-03-2491	2
R131 R44 R53	RES,MF,1/8W,1%,24.9K	MK55C-2492F	TRW	4701-03-2492	3
R42 R83 R85	RES,MF,1/8W,1%,3.01K	MK55C-3011F	TRW	4701-03-3011	3
R106 R110	RES,MF,1/8W,1%,30.1K	MK55C-3012F	TRW	4701-03-3012	2
R7	RES,MF,1/8W,1%,3.32K	MK55C-3321F	TRW	4701-03-3321	1
R107 R111	RES,MF,1/8W,1%,33.2K	MK55C-3322F	TRW	4701-03-3322	2
R74 R80	RES,MF,1/8W,1%,33.2	MK55C-33R2F	TRW	4701-03-3329	2
R127	RES,MF,1/8W,1%,3.65K	MK55C-3651F	TRW	4701-03-3651	1
R6	RES,MF,1/8W,1%,3.92K	MK55C-3921F	TRW	4701-03-3921	1
R69T R74T	RES,MF,1/8W,1%,464	MK55C-4640F	TRW	4701-03-4640	2
R11 R12 R18	RES,MF,1/8W,1%,4.75K	MK55C-4751F	TRW	4701-03-4751	3
R104 R120 R126 R133 R14 R145 R2 R92	RES,MF,1/8,1%,499	MK55C-4990F	TRW	4701-03-4990	8
R128 R132 R15 R3 R35 R45 R54 R64 R68	RES,MF,1/8W,1%,4.99K	MK55C-4991F	TRW	4701-03-4991	9
R32 R65	RES,MF,1/8W,1%,49.9K	MK55C-4992F	TRW	4701-03-4992	2
R147	RES,MF,1/8W,1%,54.9	MK55C-54R9F	TRW	4701-03-5499	1

WAVETEK PARTS LIST	TITLE MAIN	ASSEMBLY NO. 1100-00-0121 PAGE: 5	REV G

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
Q24	TRANS	2N2905A	FAIR	4901-02-9051	1
Q6 Q7 Q8	TRANS	2N3638A	FAIR	4901-03-8381	3
Q2 Q22 Q3 Q4	TRANS	2N3640	FAIR	4901-03-8420	4
Q27 Q30	TRANS	2N3905	FAIR	4901-03-9030	2
Q15 Q17 Q26	TRANS	2N3906	FAIR	4901-03-9050	3
Q10 Q11 Q12 Q13 Q14 Q18 Q19 Q20 Q21 Q25 Q9	TRANS	2N3139	FAIR	4901-05-1390	11
Q5	TRANS	TIP-29	TI	4902-00-0290	1
Q1	TRANS	TIP-30	TI	4902-00-0300	1
Q23 Q24	TRANS,M/P#2N3903 QTY:2:4901-03-9030	182-503-102	AVTK	4998-00-0015	1
135	WAFER	147-400	AVTK	5104-02-0015	3
NONE	DETENT MOD FROM:5104-01-0009	180-313	AVTK	5104-99-0024	1
NONE	DETENT MOD FROM:5104-01-0009	180-314	AVTK	5104-99-0025	1
IC6	IC	7000-03-1000	AVTK	7000-03-1090	1
IC10	IC	LM310H	NSC	7000-03-1800	1
IC1 IC2 IC4	IC	MC1741	FAIR	7000-07-4100	3

WAVETEK PARTS LIST	TITLE MAIN	ASSEMBLY NO. 1100-00-0121 PAGE: 7	REV G

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
R83	RES,MF,1/8W,1%,576	MK55C-5760F	TRW	4701-03-5760	1
R35 R61	RES,MF,1/8W,1%,604	MK55C-6040F	TRW	4701-03-6040	2
R10	RES,MF,1/8W,1%,6.19K	MK55C-6191F	TRW	4701-03-6191	1
R123 R97	RES,MF,1/8W,1%,6.81K	MK55C-6811F	TRW	4701-03-6811	2
R100 R94	RES,MF,1/8W,1%,7.87K	MK55C-7871F	TRW	4701-03-7871	2
R22	RES,MF,1/8W,1%,78.7	MK55C-78R7F	TRW	4701-03-7879	1
R8	RES,MF,1/8W,1%,8.25K	MK55C-8251F	TRW	4701-03-8251	1
R143 R144	RES,MF,1/2W,1%,100	MK65C-1000F	TRW	4701-23-1000	2
R19 R20	RES,SEL,2-10K,1/8W QTY:2:4701-03-1002	182-501-00A	AVTK	4784-00-0014	1
R50 R51 R55 R56	RES,SEL,0-4.99K,1/8W QTY:4:4701-03-4991	180-500-100A	AVTK	4784-00-0034	1
CR24 CR5 CR9	DIODE	1N4581	MICRO	4801-01-4581	3
CR1 CR2 CR3 CR4	DIODE	SCE-1	SEMTC	4801-02-0001	4
CR10 CR11 CR12 CR13	DIODE	FD-777	FAIR	4807-02-0777	4
CR14 CR15 CR16 CR17 CR18 CR20 CR21 CR22 CR23 CR25 CR26 CR6 CR7 CR8	DIODE	FD-6666	FAIR	4807-02-6666	14
Q28	TRANS	2N2219A	FAIR	4901-02-2191	1

WAVETEK PARTS LIST	TITLE MAIN	ASSEMBLY NO. 1100-00-0121 PAGE: 8	REV G

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
IC9	IC	CA-3019	RCA	7000-30-1900	1
IC7	IC	CA-3054	RCA	7000-30-5400	1
IC5	IC	CA-3096AE	RCA	7000-30-9600	1
IC3	IC	LM340	NSC	7000-34-0000	1
IC8	IC	7400	TI	6000-74-0000	1

WAVETEK PARTS LIST	TITLE MAIN	ASSEMBLY NO. 1100-00-0121 PAGE: 8	REV G

NOTE: UNLESS OTHERWISE SPECIFIED

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: MAIN BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		MODEL NO. 180LF / DWG NO. 1100-00-0121 / REV G
	DO NOT SCALE DWG		CODE IDENT 23338 / SHEET 2 OF 2
	SCALE		

REV	ECN	BY	DATE	APP

MFGN-PART-NO	MFGN	WAVETEK NO.	QTY/PT
2373F	TMP	4701-03-2373	1
2490F	TMP	4701-03-2490	2
2491F	TMP	4701-03-2491	2
2492F	TMP	4701-03-2492	5
3011F	TMP	4701-03-3011	3
3012F	TMP	4701-03-3012	2
3321F	TMP	4701-03-3321	1
3322F	TMP	4701-03-3322	2
3329F	TMP	4701-03-3329	2
3651F	TMP	4701-03-3651	1
3921F	TMP	4701-03-3921	1
4840F	TMP	4701-03-4840	2
4751F	TMP	4701-03-4751	3
4990F	TMP	4701-03-4990	8
4991F	TMP	4701-03-4991	9
4992F	TMP	4701-03-4992	2
5499F	TMP	4701-03-5499	1

ASSEMBLY NO.	REV
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REFERENCE DESIGNATORS	PART DESCRIPTION	UNIQ-MFGN-PART-NO	MFGN	WAVETEK NO.	QTY/PT
Q29	TRANS	2N2905A	FAIR	4901-02-9051	1
Q6 Q7 Q8	TRANS	2N3638A	FAIR	4901-03-6381	3
Q2 Q22 Q3 Q4	TRANS	2N5842	FAIR	4901-03-6020	4
Q27 Q30	TRANS	2N3903	FAIR	4901-03-9030	2
Q15 Q17 Q26	TRANS	2N3905	FAIR	4901-03-9050	3
Q10 Q11 Q12 Q13 Q14 Q18 Q19 Q20 Q21 Q25 Q9	TRANS	2N5139	FAIR	4901-05-1390	11
Q5	TRANS	11F-29	II	4902-00-0290	1
Q1	TRANS	11F-30	II	4902-00-0300	1
Q23 Q24	TRANS,MTCH/2N3903 QTY:2=4901-03-9030	182-503-102	AVTK	4998-00-0015	1
135	WAFER	147-400	AVTK	5104-02-0015	5
NONE	DETENT MOD FROM:5104-01-0009	180-313	AVTK	5104-99-0024	1
NONE	DETENT MOD FROM:5104-01-0009	180-314	AVTK	5104-99-0025	1
IC8	IC	7000-03-1000	AVTK	7000-03-1000	1
IC10	IC	LM318M	NSC	7000-03-1800	1
IC1 IC2 IC4	IC	MC1741	FAIR	7000-07-4100	3

WAVETEK PARTS LIST	TITLE MAIN	ASSEMBLY NO. 1100-00-0121	REV G
		PAGE: 7	

MFGN-PART-NO	MFGN	WAVETEK NO.	QTY/PT
5760F	TMP	4701-03-5760	1
6040F	TMP	4701-03-6040	2
6191F	TMP	4701-03-6191	1
6811F	TMP	4701-03-6811	2
7871F	TMP	4701-03-7871	2
7879F	TMP	4701-03-7879	1
8251F	TMP	4701-03-8251	1
1000F	TMP	4701-03-1000	2
0019A	AVTK	4789-00-0019	1
0039A	AVTK	4789-00-0039	1
	MICRO	4801-01-4581	5
	SPRTC	4801-02-0001	4
	FAIR	4807-02-0777	4
	FAIR	4807-02-8668	14
	FAIR	4901-02-2191	1

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REFERENCE DESIGNATORS	PART DESCRIPTION	UNIQ-MFGN-PART-NO	MFGN	WAVETEK NO.	QTY/PT
IC9	IC	CA-3019	RCA	7000-30-1900	1
IC7	IC	CA-3054	RCA	7000-30-5400	1
IC5	IC	CA-3096AE	RCA	7000-30-9600	1
IC3	IC	LM3900	NSC	7000-39-0000	1
IC6	IC	7400	TI	6000-74-0000	1

WAVETEK PARTS LIST	TITLE MAIN	ASSEMBLY NO. 1100-00-0121	REV G
		PAGE: 8	

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE MAIN BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1° XX ±.030		MODEL NO. 180LF / DWG NO. 1100-00-0121 / REV G
	DO NOT SCALE DWG		CODE IDENT 23338 / SHEET 2 OF 2
	SCALE		